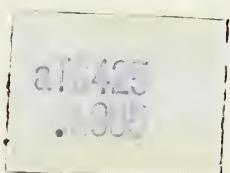


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**FINAL  
WATERSHED PLAN AND  
ENVIRONMENTAL IMPACT STATEMENT**



**AVERY BROOK WATERSHED**

**HARTFORD COUNTY  
CONNECTICUT**

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ADDENDUM

Avery Brook Watershed Plan  
Connecticut

This addendum shows project costs, benefits and the benefit cost ratio for 6 3/8 percent interest rate based on 1976 installation costs.

Annual project costs, benefits and benefit cost ratio are as follows:

1. Project Costs \$46,800
2. Project Benefits 50,900
3. Benefit Cost Ratio 1.1:1.0

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FINAL

WATERSHED PLAN AND

ENVIRONMENTAL IMPACT STATEMENT

AVERY BROOK WATERSHED  
Hartford County, Connecticut

Prepared under the Authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008) and in accordance with Section 102(2)(C) of the National Environment Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

Prepared by: Commissioner, Department of Environmental Protection, State of Connecticut  
Town of South Windsor, Connecticut  
Hartford County Soil and Water Conservation District  
U. S. Department of Agriculture, Soil Conservation Service  
U. S. Department of Agriculture, Forest Service



PREFACE

Enclosed are two documents--the Watershed Plan and Environmental Impact Statement for Avery Brook Watershed, Connecticut.

The Watershed Plan has been developed by the local sponsor with the assistance of the U.S. Department of Agriculture and is the basis for the authorization of federal assistance to implement the proposed project in accordance with the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008).

The Environmental Impact Statement has been prepared by the U.S. Department of Agriculture in compliance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

The Environmental Impact Statement contains the detailed information on project area, planned project, problems, impacts, alternatives, etc.



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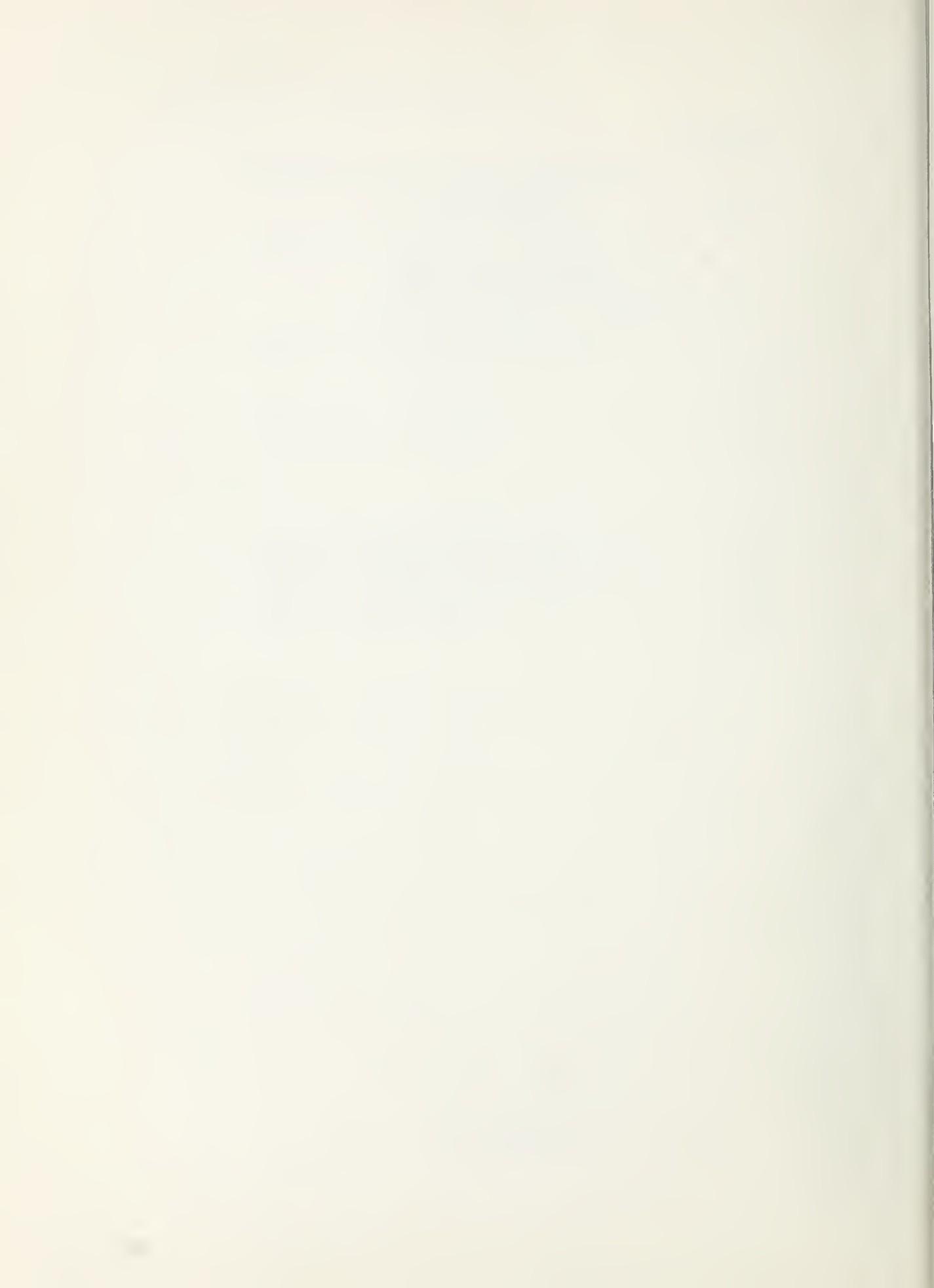
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WATERSHED PLAN

Avery Brook Watershed

Hartford County, Connecticut

December 1976



## AVERY BROOK WATERSHED

Hartford County, Connecticut

### SUMMARY AND DESCRIPTION

The Avery Brook Watershed, of 1,664 acres (2.6 square miles) is located in eastern Hartford County in the towns of South Windsor and Manchester, Connecticut. The topography ranges from gentle to moderate relief with elevations ranging from 421 to 167 feet above mean sea level.

This plan for watershed protection and flood prevention is sponsored by the Commissioner of the Department of Environmental Protection, State of Connecticut. The plan was prepared by the Sponsor with the town of South Windsor, the Hartford County Soil and Water Conservation District, the Soil Conservation Service and the Forest Service of the U. S. Department of Agriculture.

Agencies providing assistance in the development of this plan were: Department of Environmental Protection, State Department of Health, U. S. Fish and Wildlife Service, Agricultural Stabilization and Conservation Service, Hartford County Extension Service, Capitol Regional Planning Agency, and U. S. Geological Survey.

The major problem in the watershed is floodwater damage to single family residences. Damage occurs to 67 properties with 33 receiving flooding to their walk-out basement and 34 receiving flooding to yards and gardens. Some town roads are also flooded.

Land treatment, two floodwater retarding structures, and floodproofing are planned to provide protection from flooding up to a 100-year storm.

Land treatment will be applied to 150 acres of cropland, 15 acres of pastureland, 150 acres of forest land, 395 acres of urban built-up including roads, and 40 acres of other lands. Land treatment will reduce floodwater runoff by six percent, and the erosion rate will be reduced to 2.78 tons per acre. Sediment will be reduced to 0.5 mg/l at the mouth of the watershed.

The two structures with the associated pool areas and inseparable adjacent lands will provide public access to 59 acres in an urbanized area, but will restrict the use of the land which is presently in private ownership. The two sites will trap 20.5 acre-feet of sediment during the first 50 years; thus they will allow 25 acre-feet to pass the structures.

The floodproofing will involve two separate actions. The first will be the floodproofing of five houses in the downstream area. These homes cannot be protected by the structures from a 100-year storm. The Sponsor will design and install the floodproofing measures. The second action will be in the pool area of structure no. 1 where a road, two houses and three yards will be floodproofed to protect them from stored water behind the structure. This work will be done by the town of South Windsor. The cost of the second action is included as a landrights cost in this plan.

This plan will be installed over a five-year period. The installation cost of the land treatment is estimated to be \$114,900 of which \$19,900 is for accelerated technical assistance to be borne by PL-566 funds and \$6,700 to be borne by other funds. The installation cost for the two floodwater retarding structures and the floodproofing is estimated to be \$712,700. The total project cost for land treatment, structural measures and nonstructural measures is \$827,600; PL-566 funds will bear \$333,700 and other funds will bear \$493,900 of this cost.

The Soil Conservation Service will furnish the engineering, administrative services and contract for the installation of the two floodwater retarding structures.

The Sponsor will provide the necessary landrights, be responsible for the operation and maintenance of the structural and nonstructural measures, and provide engineering and administrative services as required. In securing landrights, the Sponsor will meet the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. The Sponsor will be solely responsible for providing relocation assistance advisory services, if needed.

The average annual cost of the structural and nonstructural work, which includes \$1,700 for operation and maintenance, is estimated to be \$45,100. The average annual benefits resulting from this work are estimated to be \$50,900.

This project has a benefit-cost ratio of 1.1 : 1.0.

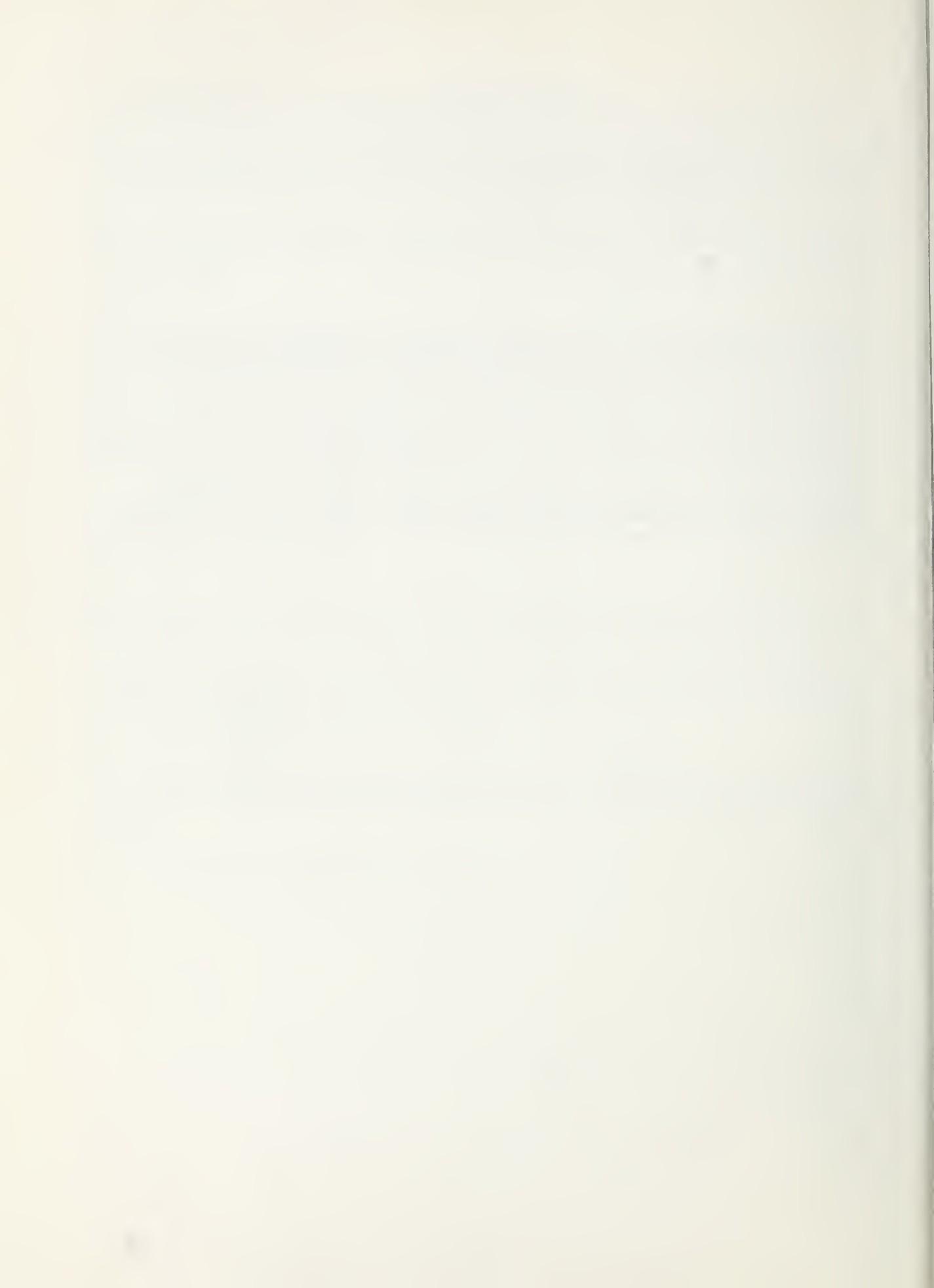
## PLANNED PROJECT

This plan provides for the installation of land treatment measures, two single-purpose floodwater retarding structures and the floodproofing of five single-family homes. (Table 1)

Land treatment will be applied to 150 acres of cropland, 15 acres of pastureland, 150 acres of forest land, 395 acres of urban and built-up and 40 acres of other land.

Technical assistance will be provided to plan land use changes, install needed conservation measures, manage watershed resources and maintain conservation measures. Assistance will be given to the planning and zoning board, conservation commission, community leaders and land developers in the proper use, treatment and development of resources.

The two single-purpose floodwater retarding structures and floodproofing of the five homes on Pine Tree Lane are planned to provide floodwater damage protection from flood events up to and including the 100-year storm event. (See the Planned Project section of the EIS for a detailed description of the Planned Project).



## INSTALLATION COST - MONETARY

The total installation cost of the works of improvement is estimated to be \$827,600. Total installation costs include \$114,900 for establishing land treatment measures on private land and \$712,700 for structural measures. Table 1 contains further cost information.

Land treatment costs include Public Law 566 funds of \$19,900 to be used by the Soil Conservation Service and Forest Service, to provide accelerated technical assistance; regular Soil Conservation Service program funds of \$5,100 and current cooperative federal-state forestry program funds of \$1,600 for technical assistance, and costs of \$88,300 for applying land treatment measures. Landowners and operators will apply land treatment measures undergoing conservation programs.

Nonstructural costs for floodproofing the five homes on Pine Tree Lane are estimated to be \$8,000 which includes \$2,000 for engineering services.

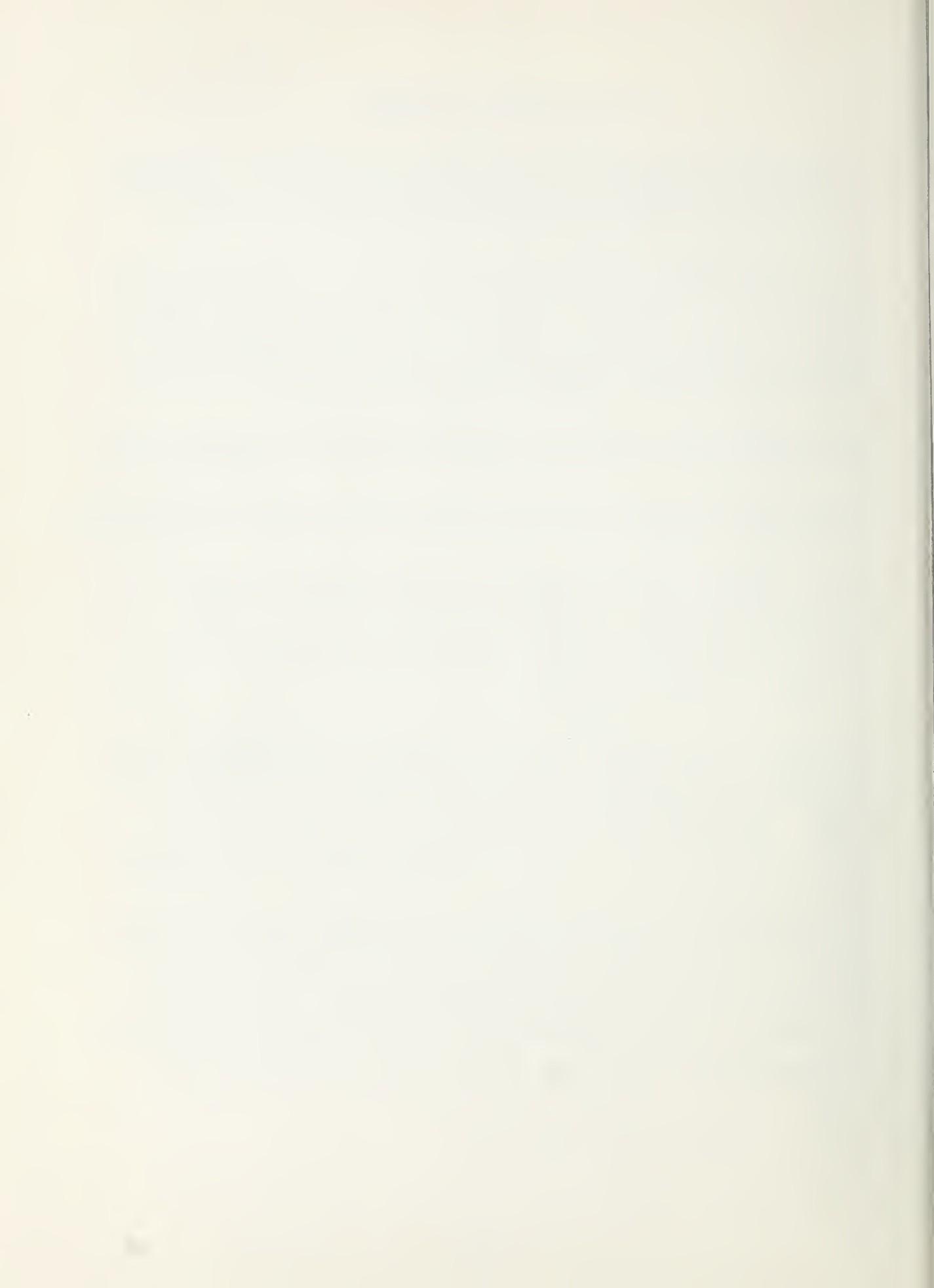
The total installation costs of structural measures include costs for construction, engineering services, land rights, and project administration.

Construction costs are based on estimated quantities and current unit costs. The unit costs are based on actual bid prices for similar projects in Connecticut. Construction costs include items such as clearing and grubbing, placement of earth fill, concrete, erosion control, seeding and landscaping. The estimated construction cost, including a 15 percent contingency allowance, is \$247,200 for the two floodwater retarding structures.

Landrights costs were estimated to be \$383,900. These costs include \$20,000 for floodproofing, \$70,000 for raising a road, \$5,000 for a pond replacement and \$288,900 for land, surveys, legal fees and other costs. Landrights costs were determined by officials of the town of South Windsor. Landrights costs, by agreement, will be shared with the Sponsor furnishing \$300,000 and the town of South Windsor furnishing those landrights costs in excess of \$300,000, estimated to be \$83,900.

Project administration costs include the cost of contract administration, relocation assistance advisory services (should relocation occur), government representatives, inspection during construction, and other administrative and clerical services necessary to install the project. The Service will bear the costs it incurs, but may not use Public Law 566 funds to assist the Sponsor to provide relocation assistance advisory services. Project administration costs are estimated to be \$48,900.

(See AGREEMENT section for cost sharing between the Sponsor and SCS.)

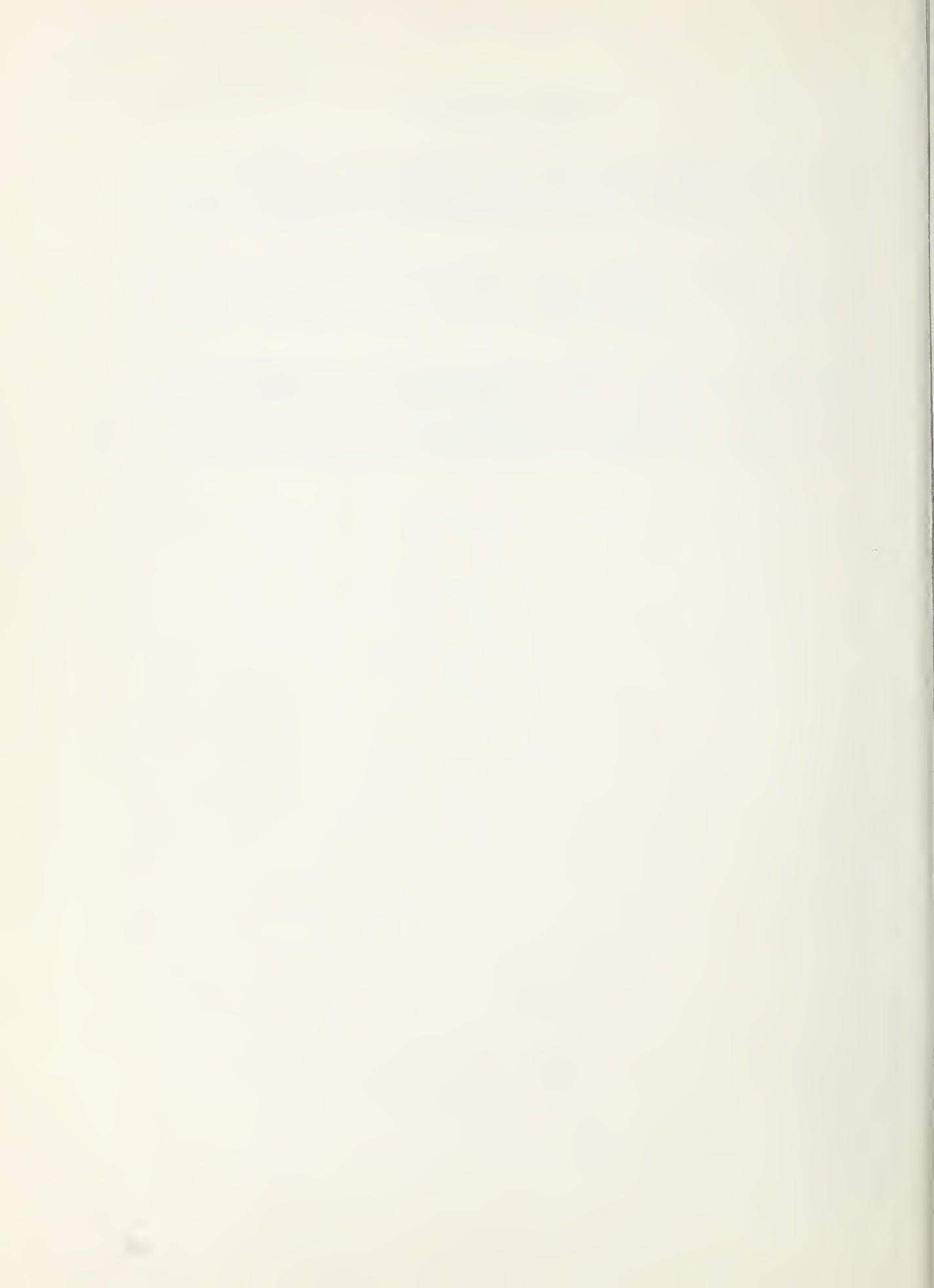


## ECONOMIC BENEFITS

Average annual flood damage reduction benefits are estimated to be \$50,900. Residential floodwater damages will be reduced by \$44,600, road floodwater damages by \$1,550, and indirect floodwater damages by \$4,750.

The installation of planned land treatment measures will provide flood damage reduction benefits of \$550 annually. These benefits were not used for project justification.

Average annual costs, benefits, and a comparison of benefits and costs are shown in Tables 4, 5 and 6, respectively. The benefit-cost ratio is based on current prices for installation costs and normalized prices for benefits and operation and maintenance costs. The ratio of annual primary benefits (\$50,900) to average annual cost (\$45,500) is 1.1 to 1.0.



## INSTALLATION AND FINANCING

The Sponsor will:

1. Acquire all necessary landrights and exercise its power of eminent domain, as necessary. Appraisals will be obtained as a prerequisite to securing landrights in accordance with provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894).
2. Provide relocation assistance advisory services without PL-566 cost sharing if it becomes necessary to relocate persons, businesses or farm operations.
3. Provide project administration services it requires such as overall inspection to determine that land treatment and structural measures are installed as planned.
4. Acquire any permits required for installation of the structural measures.
5. Floodproof five homes on Pine Tree Lane.

The town of South Windsor will:

1. By agreement with the Sponsor, raise Beelzebub Road, raise and landscape three lawns and floodproof two homes prior to or concurrently with the construction of the dam at Site 1.

The Hartford County Soil and Water Conservation District in cooperation with the sponsor, will:

1. Provide assistance to landowners and operators to help them plan, establish, and maintain land treatment measures. The land treatment measures will be installed at approximately uniform annual rates over the 5-year period. Installation of similar measures required to meet the total conservation needs will be continued thereafter.

The SCS will:

1. Through the Hartford County Soil and Water Conservation District provide technical assistance for planning, installing and maintaining conservation measures.
2. Furnish engineering services for surveys, layouts, design and preparation of plans and specifications for structural measures.
3. Provide for project administration services it requires, including a government representative, to administer the expenditure of federal funds, and inspection services to insure that all structural measures are installed in accordance with plans and specifications.

4. At the request of the Sponsor, contract for the installation of the two floodwater retarding structures.
5. Notify the National Park Service if any previously unidentified evidence of cultural values are discovered during investigations or construction in accordance with the procedures set forth in Section 3 of PL 93-291.

The U.S. Forest Service will:

1. Provide guidance and direction in planning to the Connecticut Department of Environmental Protection for implementation of the proposed forestry program. The Connecticut Department of Environmental Protection will in cooperation with the U.S. Forest Service furnish technical assistance to landowners and others for the determination of needed practices and installation of forest treatment measures.

Federal assistance, financial and other, to be furnished by SCS in carrying out the project, is contingent on the appropriation of funds for this purpose and subject to the following conditions:

1. The Sponsor has acquired all necessary landrights.
2. The necessary project agreements and operation and maintenance agreements have been executed.

The Sponsor is authorized to carry out his responsibilities under Public Act 872, Section 124 through 128, of the General Statutes of the state of Connecticut. Monies for carrying out his responsibilities as set forth in this plan will be provided in part, contingent on appropriations of such monies, from the state legislature, and in part from the town of South Windsor as established by agreement between the town and Sponsor. Funds to be provided by South Windsor will be from normal sources of revenue.

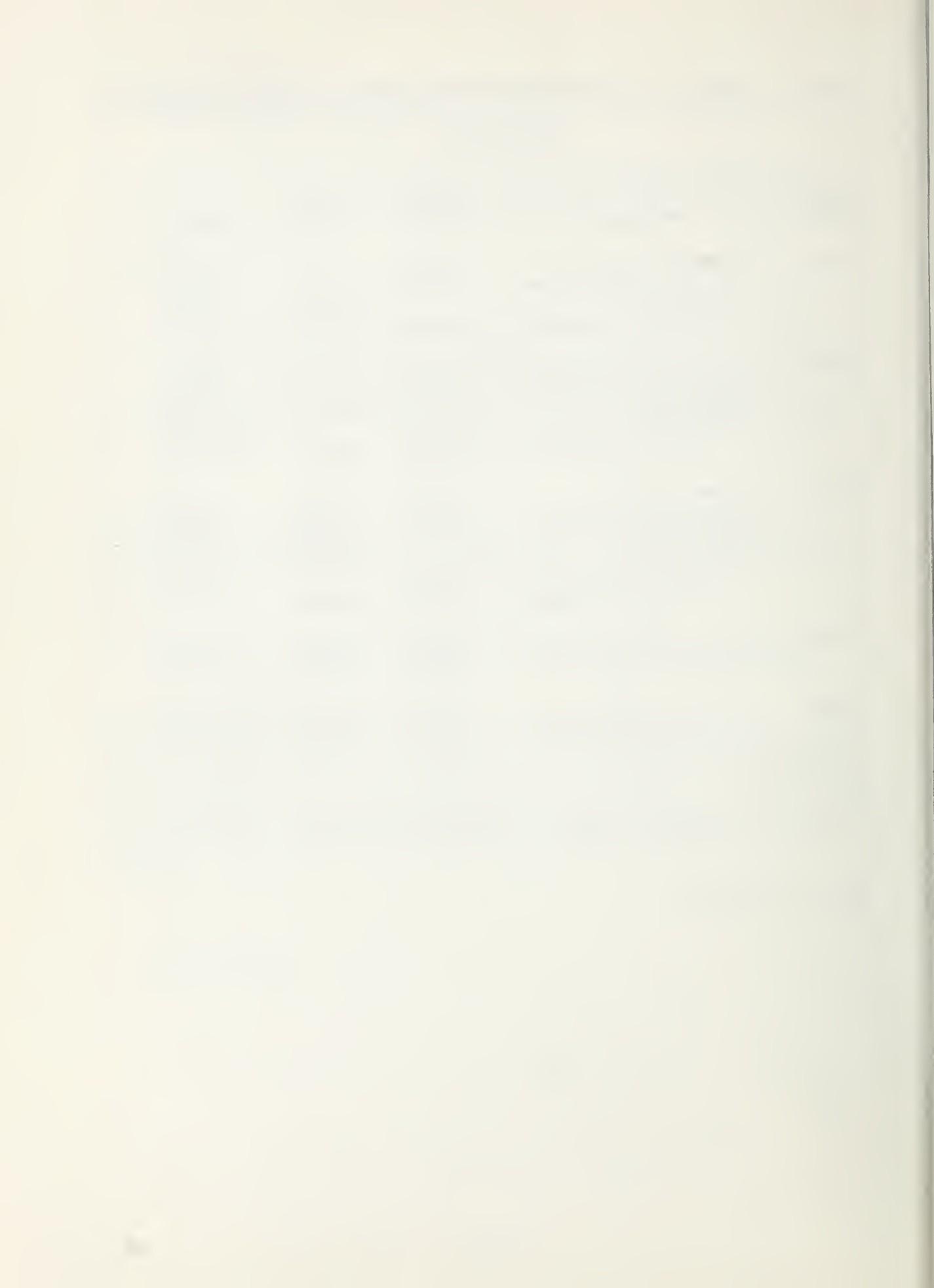
TABLE A - SCHEDULE OF OBLIGATIONS-LAND TREATMENT AND STRUCTURAL MEASURES

(Dollars)1/

Fiscal Year	Measures	PL-566 Funds	Other Funds	Total
First	Land Treatment	3,000	15,000	18,000
	Engineering Services	10,000	-	10,000
	Landrights	-	175,000	175,000
	Total First Year	13,000	190,000	203,000
Second	Land Treatment	3,900	20,000	23,900
	Engineering Services	11,500	-	11,500
	Landrights	-	150,000	150,000
	Structural (Site 1)	175,900	-	175,900
Third	Total Second Year	191,300	170,000	361,300
	Land Treatment	4,800	21,000	25,800
	Engineering Services	3,200	2,000	5,200
	Landrights	-	58,900	58,900
Fourth	Floodproofing	-	6,000	6,000
	Structural (Site 2)	71,300	-	71,300
	Total Third Year	79,300	87,900	167,200
	Total Fourth Year	4,300	20,000	24,300
Fifth	Land Treatment	3,900	19,000	22,900
	Total Fifth Year	3,900	19,000	22,900
Total Project Administration		41,900	7,000	48,900
TOTAL All Costs		333,700	493,900	827,600

1/ Price Base 1976

December 1976



## OPERATION AND MAINTENANCE PROVISIONS

### LAND TREATMENT

Land treatment measures on open land will be maintained by owners and operators on whose land the measures are installed. These measures are, or will be, provided for in conservation plans developed under agreement with the Hartford County Soil and Water Conservation District. The intensity of the operation and maintenance by landowners will be dependent upon the specific interests and personal commitments to the principles of conservation of the individual.

Forest land treatment measures installed on private land will be maintained by the landowners with technical assistance furnished by the Department of Environmental Protection in cooperation with the U.S. Forest Service.

### STRUCTURAL MEASURES

Upon acceptance from the contractor, structural works of improvement will be operated and maintained by the Sponsor. The Sponsor will perform the necessary operation and maintenance utilizing his own capabilities or through arrangements with others satisfactory to the SCS. However, a time period not exceed three years is allowed for establishment of vegetative cover associated with each structural measure. During this time period, additional work required to obtain satisfactory vegetative cover may be performed with cost sharing at the same rate as for installation of the original works.

Repairs or additional work not eligible for PL-566 financial assistance include maintenance work, and work resulting from improper operation and maintenance. However, the SCS will provide technical assistance that may be needed in performing any of these tasks.

An Operation and Maintenance Agreement between the Sponsor and the SCS will be executed immediately prior to signing a landrights, relocation, or project agreement for each structural measure. The Operation and Maintenance Agreement will provide adequate and sound arrangements for proper operation, timely inspection, and appropriate performance of needed maintenance. The agreement will comply with the State Watershed Operation and Maintenance Handbook. In addition, the O & M Agreement will include a set of standards which will govern the utilization and disposition of property, real and personal, acquired in whole, or in part with Public Law 566 funds.

All structural measures will be inspected at least annually and after every major storm or the occurrence of any unusual or adverse condition that affects their operation. The inspections, for three years following the installation of each structure, will involve representatives of the Sponsor and the SCS. After the third year, the Sponsor will make annual inspections, prepare a report and send a copy to the SCS.

## NONSTRUCTURAL MEASURES

The Sponsor will be responsible for the operation and maintenance of the floodproofing measures. By agreement the owners of the five homes on Pine Tree Lane will operate the floodproofing measures. Also by agreement the town of South Windsor will operate the floodproofing measures in Site 1.

AGREEMENT

between the following local organization:

Commissioner Of The Department Of Environmental Protection  
(Referred to herein as the Sponsor)  
State of Connecticut

and the

Soil Conservation Service  
United States Department of Agriculture  
(Referred to herein as SCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsor for assistance in preparing a plan for works of improvement for the Avery Brook Watershed, state of Connecticut, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to the SCS; and

Whereas, there has been developed through the cooperative efforts of local organizations and SCS this plan for works of improvement for the Avery Brook Watershed, state of Connecticut.

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through the SCS, and the Sponsor hereby agree on this plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this watershed plan and including the following:

1. The Sponsor will acquire, with other than PL-566 funds, such landrights as will be needed in connection with the works of improvement. (Estimated cost of \$398,900).
2. The Sponsor assures that comparable replacement dwellings will be available for individuals and persons displaced from dwelling, and will provide relocation assistance advisory services and relocation assistance, make the relocation payments to displaced persons, and otherwise comply with the real property acquisition policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894) effective as of January 2, 1971, and the regulations issued by the Secretary of Agriculture pursuant thereto. The cost of relocation payments will be shared by the Sponsor and the SCS as follows:

<u>Sponsor</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Relocation Payment Costs</u> (dollars)
-----------------------------	-------------------------	--

Relocation Payments	57.8	42.2	0*
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\* Investigation has disclosed that under present conditions the project measures will not result in the displacement of any persons, business, or farm operation. However, if relocations become necessary, relocation payments will be cost-shared in accordance with the percentages shown.

3. The Sponsor will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to state law as may be needed in the installation and operation of the works of improvement.
4. The percentages of construction costs of structural measures to be paid by the Sponsor and by the SCS are as follows:

<u>Works of Improvement</u>	<u>Sponsor</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Construction Cost</u> (dollars)
---------------------------------	-----------------------------	-------------------------	---

Two floodwater retarding structures	0	100	247,200
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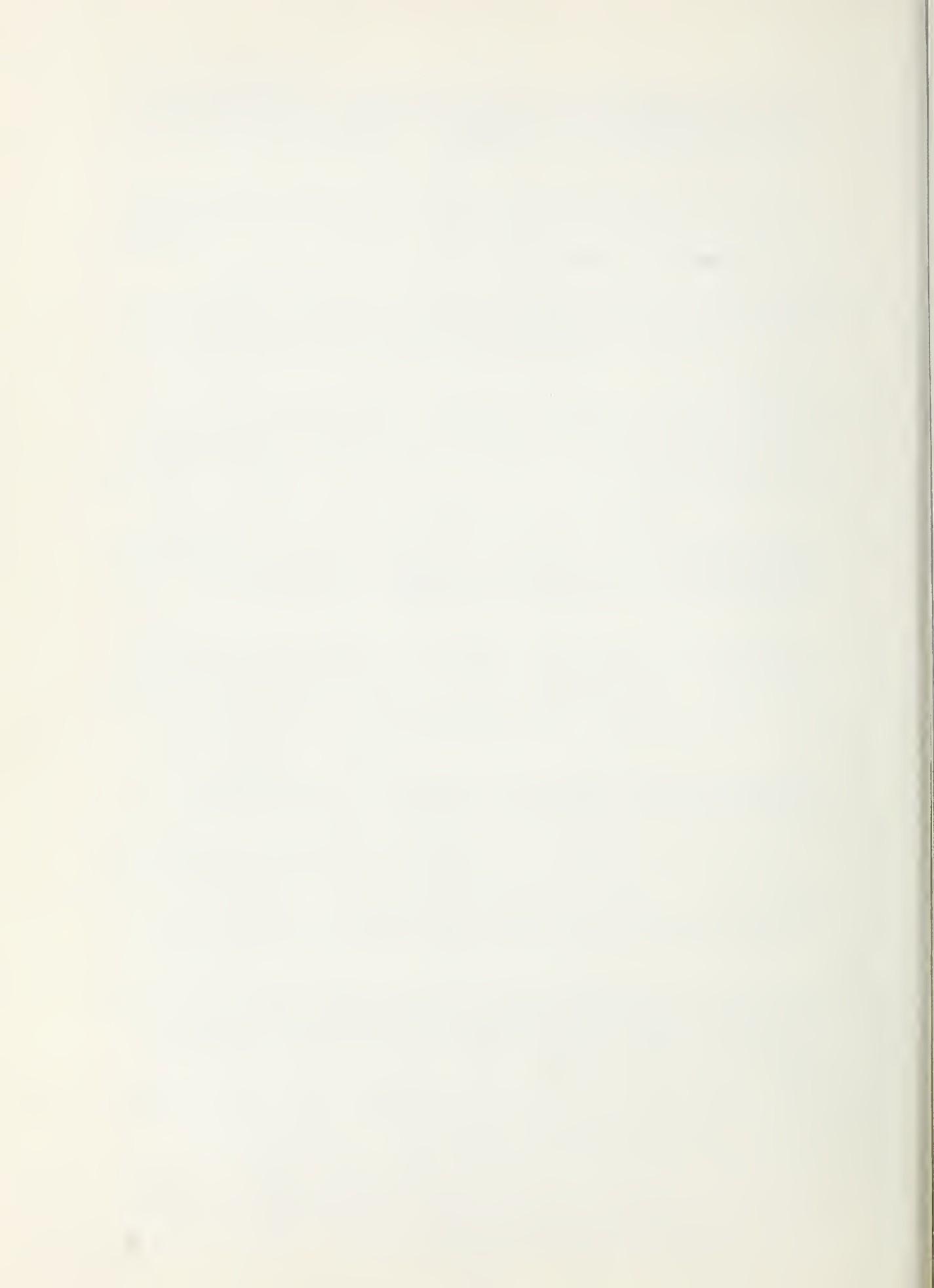
5. The percentages of the engineering costs to be borne by the Sponsor and the SCS are as follows:

<u>Works of Improvement</u>	<u>Sponsor</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Engineering Costs</u> (dollars)
---------------------------------	-----------------------------	-------------------------	---

Two floodwater retarding structures	0	100	24,700
--	---	-----	--------

6. The Sponsor and SCS will each bear the costs of Project Administration which it incurs, estimated to be \$7,000 and \$41,900 respectively.
7. The Sponsor in cooperation with the Hartford County Soil and Water Conservation District will obtain agreements from owners of not less than 50 percent of the land above each reservoir and floodwater retarding structure that they will carry out conservation farm or ranch plans on their land.

8. The Sponsor in cooperation with the Hartford County Soil and Water Conservation District will provide assistance to landowners and operators to assure the installation of the land treatment measures shown in the plan.
9. The Sponsor in cooperation with the Hartford County Soil and Water Conservation District will encourage landowners and operators to operate and maintain the land treatment measures for the protection and improvement of the watershed.
10. The Sponsor will be responsible for the operation and maintenance of the structural works of improvement by actually performing the work or arranging for such work in accordance with agreements to be entered into prior to issuing invitations to bid for construction work.
11. The costs shown in this plan represent preliminary estimates. In finally determining the costs to be borne by the parties hereto, the actual costs incurred in the installation of works of improvement will be used.
12. This agreement is not a fund obligating document. Financial and other assistance to be furnished by SCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.
13. A separate agreement will be entered into between the SCS and the Sponsor before either party initiates work involving funds of the other party. Such agreement will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.
14. This plan may be amended, revised, or terminated only by mutual agreement of the parties hereto except that SCS may terminate financial and other assistance in whole, or in part, at any time it determines that the Sponsor has failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the Sponsor in writing of the determination and the reasons for the termination, together with the effective date. Payments made to the Sponsor or recoveries by SCS under projects terminated shall be in accord with the legal rights and liabilities of the parties.
15. No member of, or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.
16. The program conducted will be in compliance with all requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964, as amended, and the regulations of the Secretary of Agriculture (7 C.F.R. 15.1-15.12), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any activity receiving federal financial assistance.



State of Connecticut  
Department of Environmental Protection

BY:

Stanley J. See  
Commissioner

DATE:

February 23, 1977

The signing of this plan is authorized by Section 25-104(e) of the 1975 Revision of the General Statutes of the State of Connecticut.

Appropriate and careful consideration has been given to the environmental statement prepared for this project and to the environmental aspects thereof.

Soil Conservation Service  
United States Department Of Agriculture

APPROVED BY:

John W. Tippie  
State Conservationist

DATE:

February 23, 1977



TABLE 1 - ESTIMATED INSTALLATION COST

## Avery Brook Watershed

Installation Cost Item	Unit	Number	Estimated Cost (Dollars) 1/					
			PL-566 Funds			Other		
			Non-Federal Land	Total	Non-Federal Land	Total	Non-Federal Land	Total
<u>LAND TREATMENT - ACCELERATED</u>								
Land area 2/								
Cropland	Acres	150			4,800		4,800	
- Pastureland	Acres	15			1,600		1,600	
Forest land	Acres	150			7,500		7,500	
Urban and Built-up	Acres	395			31,000	23,200	54,200	54,200
Other Land	Acres	40			19,000		19,000	19,000
Fire Control	Acres	500			1,200		1,200	1,200
Technical Assistance					1,600		6,700	26,600
<u>TOTAL LAND TREATMENT</u>					61,500	33,500	95,000	114,900
<u>NONSTRUCTURAL MEASURES</u>								
Floodproofing	No.	5			8,000		8,000	
<u>SUBTOTAL Nonstructural Costs</u>					8,000		8,000	
<u>STRUCTURAL MEASURES</u>								
Floodwater Retarding Structures	No.	2	271,900	271,900	383,900		383,900	655,800
<u>SUBTOTAL Structural Costs</u>			271,900	271,900	383,900		383,900	655,800
<u>PROJECT ADMINISTRATION</u>								
Construction Inspection								
Other								
<u>SUBTOTAL - Administration for Nonstructural and Structural Measures</u>								
<u>TOTAL STRUCTURAL AND NONSTRUCTURAL COSTS</u>								
<u>TOTAL ALL COSTS</u>								

1/ Price Base 1976

2/ Includes only areas estimated to be adequately protected during the project installation period.

Treatment will be applied throughout the watershed, and dollar amounts apply to total land areas, not just to adequately protected areas.

3/ Federal agency responsible for assisting in installation of works of improvement.

December 1976

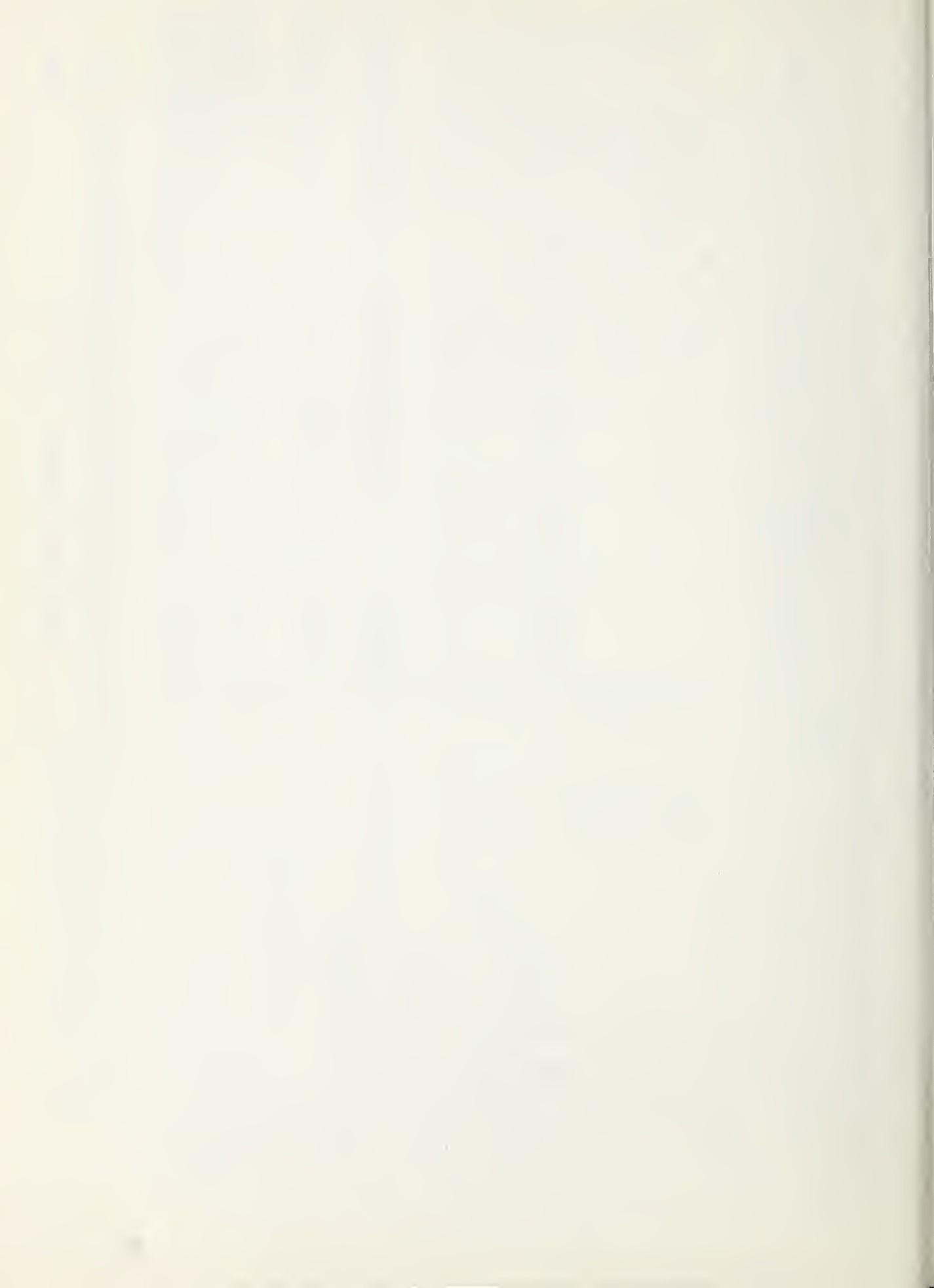


TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT  
 (At Time of Plan Preparation)

AVERY BROOK WATERSHED

Measures	Unit	Applied to Date	Total Cost (Dollars) 1/
<u>Land Treatment</u>			
Conservation cropping system	Acres	18	900
Field border planting	Feet	500	300
Crop residue management	Acres	18	900
Woodland management	Acres	12	720
Hayland planting	Acres	14	900
Recreation area improvement	Acres	2	300
Tree planting	Acres	22	2,200
Wildlife, wetland habitat mgt.	Acres	5	250
Recreation trail & walkway	Feet	4,000	2,500
Diversion	Feet	1,500	1,500
Fish pond management	No.	2	500
Pond	No.	6	15,000
Water control structure	No.	1	2,500
Drainage main or lateral	Feet	150	400
Fire Control	Acres	500	600
TOTAL	xxxxx	xxxxx	29,470

1/ Price Base 1976

December 1976



TABLE 2 - ESTIMATED COST DISTRIBUTION

Avery Brook Watershed, Connecticut

(Dollars) 1/

Item	Installation Costs PL-566 Funds			Installation Costs Other Funds			Total Installation Costs
	Con-struction	Engi-neering	Total PL-566	Con-struction	Engi-neering	Land Rights	
<b>STRUCTURAL MEASURES</b>							
Floodwater Retarding Structures:							
No. 1	175,900	14,300	190,200				513,900
No. 2	71,300	10,400	81,700				141,900
SUBTOTAL-Structural	247,200	24,700	271,900				383,900
<b>NONSTRUCTURAL MEASURES</b>							
Floodproofing				6,000	2,000		8,000
SUBTOTAL-Nonstructural				6,000	2,000		8,000
PROJECT ADMINISTRATION	xxxx	xxxx	41,900	xxx	xxx		8,000
GRAND TOTAL	247,200	24,700	313,800	6,000	2,000	383,900	398,900
							712,700

1/ Price Base 1976

2/ Includes \$70,000 to raise Beelzebub Road, \$20,000 to floodproof two homes in fringe of pool and \$5,000 to replace a 1/3-acre pond.

December 1976



TABLE 3 - STRUCTURAL DATA  
DAMS WITH PLANNED STORAGE CAPACITY  
AVERY BROOK WATERSHED, CONNECTICUT

Item	Unit	Structure Number		Total
		Site 1	Site 2	
Class of Structure		C	C	
Drainage Area (total)	Sq. Mi	1.27	0.41	1.68
Curve No. (1 day) (AMC II)		70	71	
Elevation Top of Dam	Feet	231.5	281.6	
Elevation Crest Emergency Spillway	Feet	226.4	278.5	
Elevation Crest High Stage Inlet	Feet	225.4	277.5	
Maximum Height of Dam	Feet	25	20	
Volume of Fill	Cu. Yd.	29,200	9,700	38,900
Total Capacity <sup>1/</sup>	Ac. Ft.	239.5	94.5	334.0
Sediment Submerged	Ac. Ft.	7.9	1.9	9.8
Sediment Aerated	Ac. Ft.	7.8	2.9	10.7
Retarding	Ac. Ft.	223.8	89.7	313.5
Between High and Low Stage	Ac. Ft.	191.3	76.0	267.3
Surface Area				
Sediment Pool <sup>2/</sup>	Acres	(7.4)	(3.2)	(10.6)
Retarding Pool	Acres	34.5	15.1	49.6
Principal Spillway Design				
Rainfall Volume (areal)(1 day)	Inches	6.9	6.9	
Rainfall Volume (areal)(10 day)	Inches	13.2	13.2	
Runoff Volume (10 day)	Inches	6.26	6.46	
Capacity of Low Stage (Max.)	cfs	49	11	
Capacity of High Stage (Max.)	cfs	85	39	
Frequency Operation-Emer. Spillway	% chance	1.0	1.0	
Dimensions of Conduit	Inches	30	30	
Emergency Spillway Design				
Rainfall Volume (ESH)(areal)	Inches	10.0	10.0	
Runoff Volume (ESH)	Inches	6.2	6.4	
Storm Duration	Hours	6	6	
Type		Concrete	Earth	
Bottom Width	Feet	20 3/	95	
Velocity of Flow (Ve)	Ft./Sec.	24.5	4.3	
Slope of Exit Channel	Ft./Ft.	0.33	0.028	
Max. Reservoir Water Surface Elevation	Feet	228.0	279.0	
Freeboard Design				
Rainfall Volume (FH)(areal)(6 hours)	Inches	24.0	24.0	
Runoff Volume (FH)	Inches	19.5	19.7	
Storm Duration	Hours	6	6	
Max. Reservoir Water Surface Elevation	Feet	231.5	281.6	
Capacity Equivalents				
Sediment Volume	Inches	0.24	0.22	
Retarding Volume	Inches	3.31	4.11	
Beneficial Volume	Inches	0	0	

1/ Crest of emergency spillway

2/ Dry dam - no permanent water will be stored

3/ Rounded trapezoidal weir box inlet

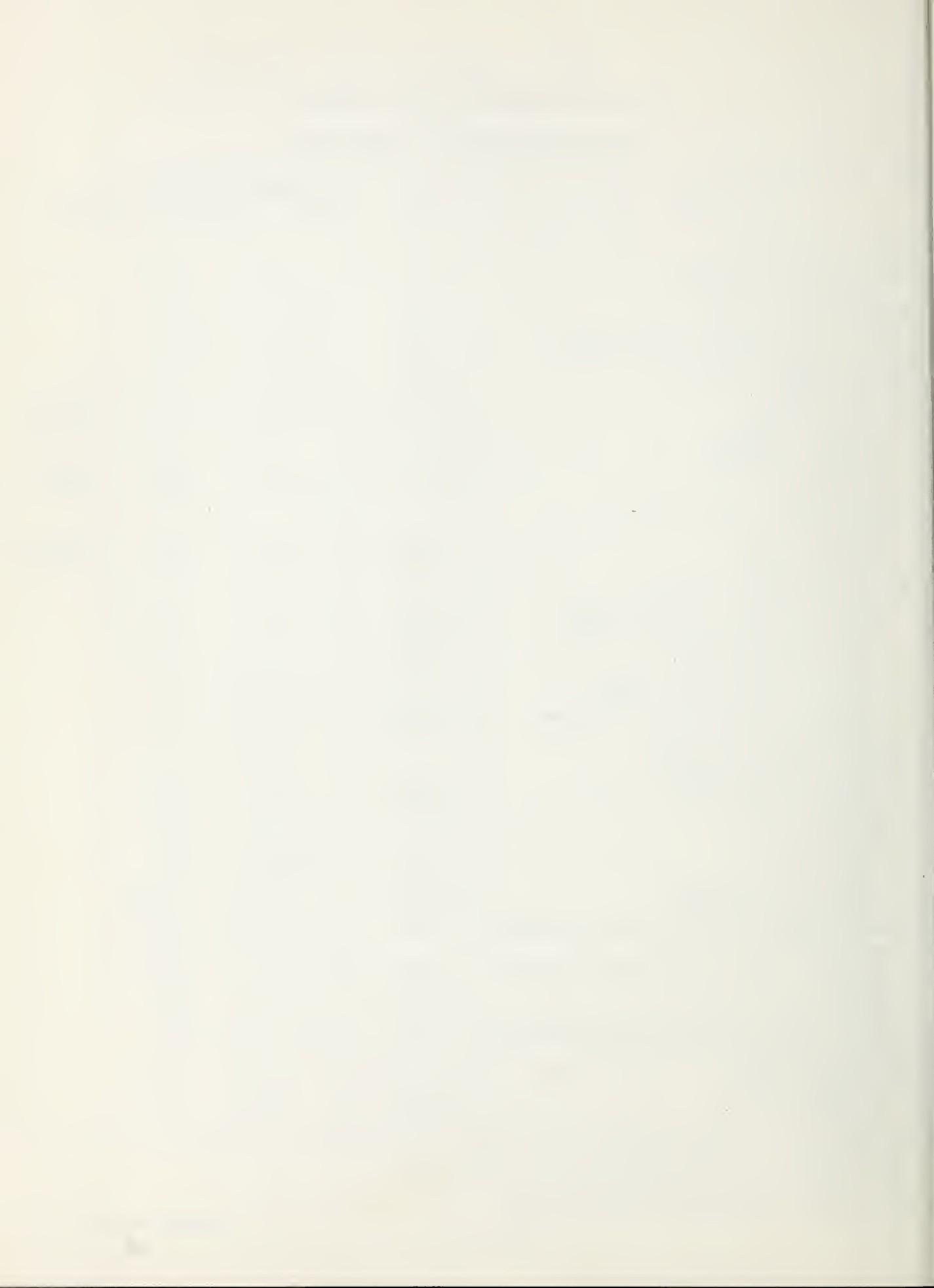


TABLE 4 - ANNUAL COST  
 AVERY BROOK WATERSHED, CONNECTICUT  
 (Dollars) 1/

Evaluation Unit	Amortization of Installation Cost <u>2/</u>	Operation and Maintenance Cost	Total
All Structural Measures	40,800	1,300	42,100
Project Administration	3,000		3,000
GRAND TOTAL	43,800	1,300	45,100

1/ Price Base 1976

2/ 100 years @ 6-1/8 percent interest

December 1976



TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

AVERY BROOK WATERSHED, CONNECTICUT

(Dollars) 1/

Item	Estimated Average Annual Damage		Damage Reduction Benefit <u>2/</u>
	Without Project	With Project	
Floodwater			
Non-agricultural			
Residential Damages	51,350	6,750	44,600
Road Damages	1,950	400	1,550
Subtotal	53,300	7,150	46,150
Indirect	5,450	700	4,750
<b>TOTAL</b>	<b>58,750</b>	<b>7,850</b>	<b>50,900</b>

1/ Price Base 19762/ Excludes Effects of Accelerated Land Treatment Measures

December 1976



TABLE 6 - COMPARISON OF BENEFITS AND COSTS  
 AVERY BROOK WATERSHED, CONNECTICUT  
 (DOLLARS)

Evaluation Unit	AVERAGE ANNUAL BENEFITS <sup>1/</sup>		Average Annual Cost <sup>3/</sup>	Benefit Cost Ratio
	Damage Reduction <sup>2/</sup>	Total		
Site 1 and Site 2	50,900	50,900	42,100	1.2:1.0
Project Administration			3,000	
GRAND TOTAL	50,900	50,900	45,100	1.1:1.0

1/ Price Base 1976

2/ From Table 5

3/, From Table 4

December 1976



FINAL ENVIRONMENTAL IMPACT STATEMENT

Avery Brook Watershed

Hartford County, Connecticut



USDA-SCS-EIS-WS-(ADM)-76-3-F-CT

AVERY BROOK WATERSHED  
HARTFORD COUNTY, CONNECTICUT

FINAL ENVIRONMENTAL IMPACT STATEMENT

John W. Tippie  
State Conservationist  
Soil Conservation Service

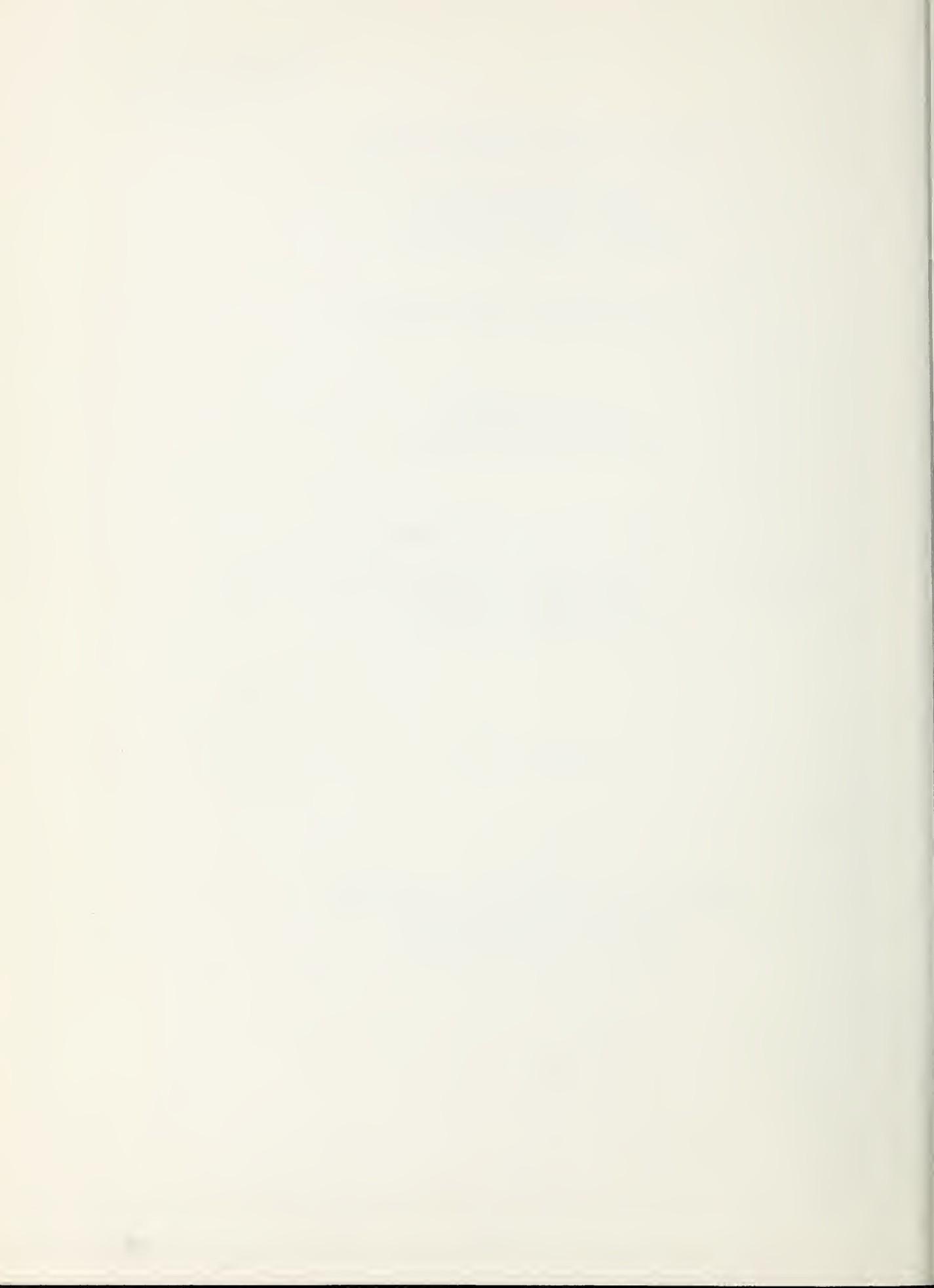
Sponsoring Local Organization

Commissioner of the Department of Environmental Protection  
State Office Building  
165 Capitol Avenue  
Hartford, Connecticut 06115

DECEMBER 1976

Prepared By

UNITED STATES DEPARTMENT OF AGRICULTURE  
Soil Conservation Service  
Mansfield Professional Park  
Storrs, Connecticut 06268



USDA ENVIRONMENTAL IMPACT STATEMENT

Avery Brook Watershed Project

Hartford County

Connecticut

Prepared in Accordance With  
Section 102(2)(C) of P.L. 91-190.

Summary

- I Final
- II Soil Conservation Service
- III Administrative
- IV Description of project purpose and action

A watershed project for watershed protection and flood prevention to be carried out by the Department of Environmental Protection, Sponsoring Local Organization, with federal assistance under authority of Watershed Protection and Flood Prevention Act (Public Law 566, 83d Congress, 68 Stat. 666), as amended. The project is located in the town of South Windsor, Hartford County, Connecticut and encompasses an area of 1,664 acres. This plan proposes conservation land treatment supplemented by two floodwater retarding structures and floodproofing.

- V Summary of environmental impacts including favorable and adverse environmental effects

Land treatment will reduce floodwater runoff by six percent and erosion rate will be reduced to 2.78 tons per acre. Sediment will be reduced to 0.5 mg/l at mouth of the watershed.

The structures with the associated pool areas and inseparable adjacent lands will provide 59 acres of permanent open space in an urbanized area. Public access will be provided to the flood pool areas at sites 1 and 2.

The two sites will trap 20.5 acre-feet of sediment during the first 50 years; thus will allow only 25 acre-feet to pass the structures.

Sites 1 and 2 will reduce floodwater damages by 86 percent.

The flood plain area will be reduced by 77 percent, benefiting 67 homeowners and the town.

Installation of two structures will create five man-years of employment.

Public health will be improved by the reduced possibility of flooding old abandoned septic systems.

An additional 0.77 million dollars will enter the economy directly.

The project will restrict the use of about 59 acres of land which is presently in private ownership.

Installation of the two structures will destroy 315 feet of stream channel.

The temporary storage of floodwater at the two sites will inundate 49.6 acres and 5,900 feet of stream channel during the occurrence of a 100-year frequency storm

Water, noise and air pollution will be increased during construction.

The land use of each site will be changed by the installation.

## VI List of Alternatives

Accelerated land treatment

Accelerated land treatment supplemented by acquisition of all flood plain property

Accelerated land treatment supplemented by flood plain zoning, floodproofing and flood insurance

Accelerated land treatment and structural measures

No project

## VII Agencies from which comments have been received

Department of Agriculture - Office of Equal Opportunity

Department of Health, Education and Welfare

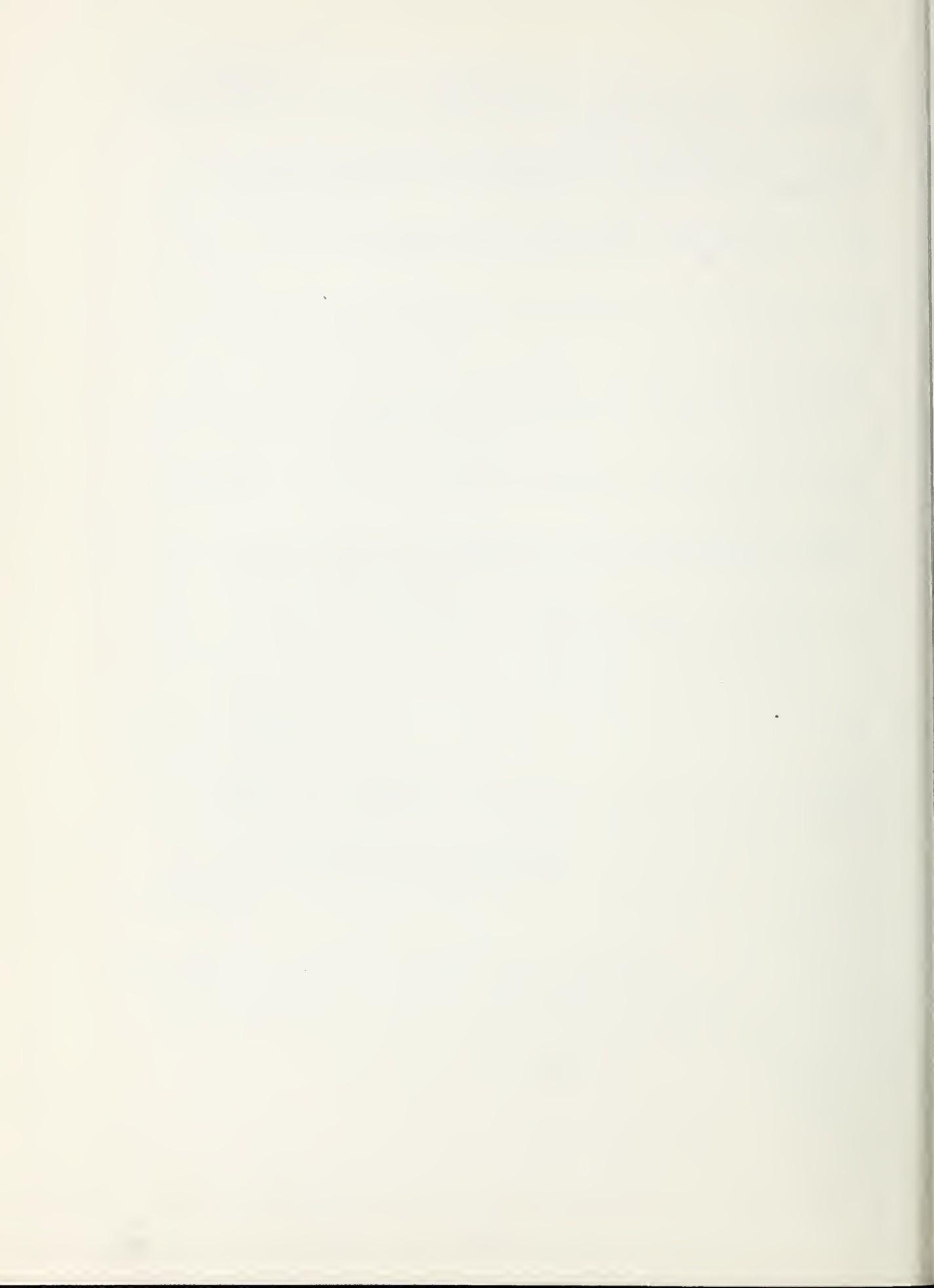
Department of the Interior

Department of Transportation

Environmental Protection Agency

Governor of Connecticut - Department of Environmental Protection,  
designated representative

VIII Draft Statement transmitted to CEQ on August 30, 1976



USDA SOIL CONSERVATION SERVICE

Final Environmental Impact Statement\*

for

Avery Brook Watershed, Connecticut

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of PL-83-566, 83d Congress, 68 Stat. 666, as amended.

SPONSORING LOCAL ORGANIZATION

Commissioner of the Department of Environmental Protection  
State of Connecticut

- \* All information and data, except as otherwise noted by reference to source, were collected during watershed planning investigations by the Soil Conservation Service and the Forest Service of the U.S. Department of Agriculture.



## PROJECT PURPOSES AND GOALS

The purposes of the project are watershed protection and flood prevention. The objectives include reduction of floodwater damages, sediment deposition, and erosion.

## PLANNED PROJECT

The planned project provides for the installation of land treatment measures, two single-purpose floodwater retarding structures and flood-proofing measures to protect five single-family residential units along Pine Tree Lane. The land treatment measures, the structural measures and the floodproofing measures will be installed during a 5-year installation period.

### Land Treatment

The land treatment for this watershed is designed to meet the needs for adequate treatment of watershed lands. Watershed land to be treated during the project installation period includes 150 acres of cropland, 15 acres of pastureland, 150 acres of forest land, 395 acres of urban and built-up land and 40 acres of other land.

Land treatment measures applied to cropland will consist of contour farming, conservation cropping system, crop residue use, and minimum tillage.

Multiple use management and improvement measures on forest land will be applied to 150 acres of forest land with emphasis placed on tree planting to maintain hydrologic conditions and for wildlife habitat and aesthetic improvement. The Cooperative Fire Protection program is to be continued.

Practices to urban and built-up areas will include critical area plantings, temporary sediment basins, diversions and grassed waterways. These practices are primarily associated with new construction areas.

To other lands, land treatment will include pond construction, recreation area planting, wildlife upland habitat management, and wildlife wetland habitat management.

Technical assistance will be provided to plan land use changes, install needed land treatment measures, manage watershed resources and maintain conservation measures. Assistance will be given to the planning and zoning board, conservation commission, community leaders and land developers in the proper use, treatment and development of watershed resources.

#### Structural Measures

Items	Unit	Structures		Total
		# 1	# 2	
Purpose		Flood Prevention	Flood Prevention	-
Height of Dam	Feet	25	20	-
Length of Dam	Feet	720	460	-
Earth Fill Volume	Cu. Yd.	29,200	9,700	38,900
Principal Spillway Size	Inches	30	30	-
Emergency Spillway				
Chance of Use	Percent	1.0	1.0	-
Type		Concrete	Earth	-
Width	Feet	20	95	-
Drainage Area	Sq. Mi.	1.27	0.41	1.68
Sediment Storage	Ac. Ft.	15.7	4.8	20.5
Sediment Trap Efficiency	Percent	45	45	-
Flood Storage Volume	Ac. Ft.	223.8	89.7	313.5
Flood Pool Surface	Acres	34.5	15.1	49.6

The single-purpose structure at Site 1 is on the main branch of Avery Brook approximately 900 feet upstream of Avery Street. It has a drainage area of 812 acres and will provide 239.5 acre-feet of total storage capacity. This capacity includes 15.7 acre-feet for the expected sediment accumulation over 50 years. There will be no permanent water stored in Site 1.

The structure at Site 1 will require 1.7 acres of land for the dam and emergency spillway. The dam will be 25 feet high and constructed of 29,200 cubic yards of compacted earth fill. Sufficient fill material for construction of the dam can be obtained from the east side of Avery

Brook, 400 feet upstream from the dam within the storage area. Soil materials within the area of the proposed embankment consist of poorly graded sands with a silt-clay fraction and fragmental rock in the right abutment; stratified sands with possible shallow bedrock in the left abutment. The two-stage principal spillway will have an average discharge of 67 cubic feet per second and a peak discharge of 85 cubic feet per second; it will consist of a reinforced concrete riser, a 30-inch diameter reinforced concrete pipe, and an impact basin outlet. The emergency spillway will consist of a trapezoidal weir box inlet 20 feet wide and 35 feet long, a reinforced concrete chute and an outlet energy dissipator. The improvements at Site 1 will not require any relocations.

The planned sediment storage area of this floodwater retarding structure is designed to be self-draining. The flood detention and sediment storage volume at the emergency spillway crest elevation will require 34.5 acres of land. An additional 1.8 acres of land will be required for an access road. This road will provide right-of-way for purposes of inspection and operation and maintenance.

Landrights will be acquired to the total land area required at Site 1. This land is now in cropland, pasture, Type 2 and 3 wetland, stream, urban built-up and roadways.

Eight hundred feet of Beelzebub Road will be raised through the upper portion of the detention pool. Raising the roadway will necessitate the regrading of three lawns and driveways. Two homes will be floodproofed to elevation 228.0 MSL to prevent stored floodwater from entering.

The single-purpose structure at Site 2 is on Dart Hill Brook, a tributary of Avery Brook, approximately 1,000 feet upstream of the junction of Avery Street and Beelzebub Road. It has a drainage area of 262 acres and will provide 94.5 acre-feet of total storage capacity. This capacity includes 4.8 acre-feet for the expected sediment accumulation over 50 years. There will be no permanent water storage in Site 2. The dam will be 20 feet high and constructed of 9,700 cubic yards of compacted earth fill. This structure will require 1.5 acres of land area which is presently in forestland. Sufficient fill material for construction of the dam at Site 2 will be obtained from the emergency spillway excavation area and additional fill, if required, will be obtained two to three hundred feet northeast of the dam within the detention area. Soil materials within the area of the proposed embankment consist of poorly graded, non-stratified sands, silt, clay, cobbles and boulders. The two-stage principal spillway will have an average discharge of 25 cubic feet per second and a peak discharge of 39 cubic feet per second; it will consist of a reinforced concrete riser, a 30-inch diameter reinforced concrete pipe, and an impact basin outlet. The emergency spillway will be a vegetated earth spillway 95 feet wide located in the left abutment. The construction at Site 2 will not require any relocations.

The planned sediment storage area of this floodwater retarding structure is designed to be self-draining.

The 15.1 acres in the detention and sediment storage area of this structure is now in stream, Type 7 wetland and woodland. The access road and other associated land areas amount to 4.4 acres of forest land. A total of 21 acres of land will be acquired at Site 2.

The Connecticut Historical Commission and the Central Connecticut State College Department of Anthropology have stated that planned project measures will not encroach upon any archaeological or historic values. The National Park Service will be notified if any previously unidentified evidence of cultural values are discovered during detailed investigations or construction in accordance with the procedures set forth in Section 3 of PL 93-291. Since this is a federally assisted local project, there will be no change in the existing responsibilities of any federal agency under Executive Order 11593 with respect to archaeological and historical resources.

#### Nonstructural Measures

Five single-family houses along Pine Tree Lane upstream of Benedict Lane will experience flooding to their walkout basement areas from a 100-year storm with the flood detention structure in place. To meet project objectives, it will be necessary to install floodproofing measures to these residential units.

The floodproofing measures to be incorporated here will consist of a method to close and seal all exterior wall openings up to the 100-year design storm datum. These openings will be provided with closure assemblies that can be easily installed or positioned in an emergency flood situation. The houses that have closure assemblies installed will be provided with sump pumping equipment to keep the basement area of these buildings free of water that might otherwise seep into these houses.

Each contract will require that contractors adhere to strict guidelines for minimizing soil erosion, water, noise and air pollution during construction. The guidelines will include measures such as sediment basins and temporary vegetation and mulching to protect exposed areas until permanent vegetation is established. Adherence to state and local health requirements will be required regarding disease vector control, noise and air pollution. Suppressors will be used to keep dust within tolerable limits. Pollution of surface areas or ground water by chemicals, fuel, lubricants, sewage and other pollutants will not be permitted. In the event a spill does occur, the appropriate U.S. Environmental Protection Agency office and the Connecticut Department of Environmental Protection will be notified. Clearing and disposal of brush and vegetation will be carried out in accordance with applicable state and local laws.

All operations will be conducted to minimize stream turbidity at and below the structures. Conduits or bridges will be installed where construction activities cross flowing streams. Solid waste generated during both the construction of the dams and operation and maintenance will be disposed of in accordance with appropriate state and local regulations. Vector control will be mutually agreed upon by the Soil Conservation Service and the Sponsor.

The town will continue to work toward land use planning which will utilize resources for the good of the community. Technology for proper resource management will be provided by the Hartford County Soil and Water Conservation District, the Capitol Regional Planning Agency and other state agencies.

The town has adopted an ordinance that requires subdivision developers to incorporate means to retard any increase runoff that would result from the change in land use. This ordinance and resources management measures adopted by the town will contribute to good use of local resources.

#### Operation and Maintenance

Land treatment measures on open land will be maintained by owners and operators of land where the measures are installed. These measures are, or will be, provided for in conservation plans developed under agreement with the Hartford County Soil and Water Conservation District. The intensity of the operation and maintenance by landowners will be dependent upon the specific interests and personal commitment to the principles of conservation of the individual.

Forest land treatment measures installed on private land will be maintained by the landowners with technical assistance furnished by the Connecticut Department of Environmental Protection, in cooperation with the U.S. Forest Service under the going forestry program.

The Sponsoring Local Organization will be responsible for the operation and maintenance of the structural measures. An Operation and Maintenance Agreement between the Sponsor and the Soil Conservation Service will be executed prior to the signing of a project agreement for the structural measures. The Operation and Maintenance Agreement will provide adequate and sound arrangements for proper operation, timely inspection and appropriate performance of needed maintenance. It is estimated that the annual cost of operation and maintenance will be \$1,300. Funds for the operation and maintenance of the structures will be from appropriations by the state Legislature. Items of maintenance will include, but not be limited to, the principal spillway and its appurtenances, the emergency spillway, the earth fill and the vegetative cover of the earth fill.

By agreement the town of South Windsor will operate and maintain, for the Sponsoring Local Organization, the floodproofing measures installed at Site 1 and at Pine Tree Lane.

Vegetative cover will be maintained by the application of seed, lime and fertilizers and by mowing to control height and invading shrubs and trees.

All structural measures will be inspected at least annually and after every major storm or the occurrence of any unusual or adverse condition that affects their operation. The inspections, for three years following the installation of each structure, will involve representatives of the Sponsoring Local Organization and the Soil Conservation Service. Inspections after the third year will be made annually by the Sponsoring Local Organization. They will prepare a report and send a copy to the Service.

An establishment period of three years is provided for all structural works of improvement and associated vegetative cover. During this period, the Service may use PL-566 funds to cost-share on any repairs or other work resulting from unknown conditions or deficiencies. The cost of repairs will be shared in the same ratio as the original structure.

Repairs or additional work not eligible for PL-566 financial assistance include maintenance work and work resulting from improper operation and maintenance. However, the Service will provide technical assistance that may be needed in performing any of these tasks.

#### Project Costs

The total project cost is \$827,600. Of this amount, the land treatment amounts to \$114,900 and structural measures \$712,700. The total project cost will be \$333,700 from PL-566 funds and \$493,900 from other funds. The \$247,200 construction cost for the two dams will be borne by PL-566.

## ENVIRONMENTAL SETTING

### PHYSICAL RESOURCES

Avery Brook Watershed drains 1,664 acres and is located in the eastern part of Hartford County, Connecticut. The major portion of the watershed is in the town of South Windsor with the remainder, which includes the outlet, in the town of Manchester. The watershed is in north central Connecticut east of the Connecticut River about nine miles northeast of the State Capitol in Hartford. Avery Brook is a small tributary of the Hockanum River which is in the Connecticut River Basin. The watershed is in Subregion B of the Northeast Atlantic Region as delineated by the Water Resources Council.

The watershed has an estimated population of 3,600 persons with about three-quarters of the number located in the lower portion of the watershed east of Avery Street in a suburban setting. More than 30 percent of the watershed acreage is in housing, 17 percent is in three active farms, 30 percent is in privately owned forest land with the remainder in other uses. It is anticipated that the watershed will continue to go into housing at a rapid rate.

Soil resource problems of the watershed can be grouped into two general categories: (1) Short-term agricultural use and (2) Long-term urban use where the lands are undergoing mass mechanical upheaval during urban development. There are less than 300 acres of crop and pastureland, all of which are located in the upper reaches. The existing area of urban development is concentrated in the lower part of the watershed, although new home developments are appearing sporadically throughout the watershed.

Water resource problems are confined to the area adjacent to the brook. Flooding occurs to the lower levels of 33 homes and to the yards and gardens of 67 homes. Throughout the watershed, most streets that cross the brook are flooded during the passage of a five- to ten-year storm.

Avery Brook Watershed is located in the east portion of the Central Connecticut Lowland physiographic province. Watershed topography ranges from gentle to moderate relief with the overall topographic expression probably reflecting the configuration of the underlying bedrock. The elevation ranges from 421 feet above mean sea level (in the northern section) to 167 feet above mean sea level (at the outlet of the watershed). The bedrock throughout the watershed is the Triassic Portland arkose formation which appears as a reddish-brown to maroon micaceous arkose and siltstone. Bedrock exposure is fairly common in the watershed, as it is found as outcroppings, and is also frequently encountered in road cuts and foundation excavation.

Surficial deposits have a limited variability with glacial till being the predominant depositional product. Some terrace sands, silts, and clays have been locally identified in the watershed. Recent stream deposits of alluvium are also common to the stream valleys and smaller tributaries.

Watershed soils consist of uplands, outwash terraces, and flood plains; patterns are complex with regard to texture, drainage, slope, and stoniness. The soils on uplands are the most extensive. They are deep to bedrock and are formed in acid glacial till or silty mantled glacial till derived from sandstone, shale, basalt, and crystalline rocks. Approximately all upland soils are nearly level to sloping, well drained, and moderately permeable. A few soils in low lying areas have seasonal high water tables and some of these soils have compact, slowly permeable subsoils. The upland soils have predominant textures of fine sandy loam, loam, and silt loam. Most of the soils on uplands are naturally very stony; however, surface stones have been removed in many of the cleared areas.

Terrace soils are found mostly in the lower part of the watershed. They are deep to bedrock and are formed in acidic gravelly, and silty mantled outwash. They have been derived from sandstones, conglomerates, and crystalline rocks. The silty mantled terrace soils are nearly level to sloping. These soils range from very poorly drained to excessively drained. They have moderate to rapid permeability. The few wet terrace soils occur in low areas on nearly level slopes. Most of the well drained to excessively drained gravelly terraces soils are gently sloping. These soils have irregular surface topography and most have rapid permeability.

The flood plain soils occur in the narrow valleys of Avery Brook and its tributary to the east. They are found in areas of relatively shallow to bedrock alluvial soils which are common to the upper reaches of the watershed. Depth to bedrock becomes progressively deeper in the downstream reaches south of Beelzebub Road. The soils have been derived primarily from sedimentary and igneous rock ranging in low to moderate acidity. The sediments originated from nearby uplands. The flood plain soils are nearly level, very poorly drained, and moderately permeable. Texture is mostly silt loam. The soil capability classes (Appendix F) of the watershed range from I to VIII with most of the area within Classes II to IV. The major use limitations are slope, stoniness, droughtiness, hazard of erosion, and wetness.

Soils in the watershed are of a glacial origin, having been derived primarily from reddish triassic sedimentary rocks which in turn are responsible for the soil color in the watershed.

The watershed is within a low earthquake risk zone area. It lies entirely within Zone 1, which ranges from V to VI on the modified Mercalli Intensity Scale of 1931, representing the possibility of minor damage. As recently as late 1963, some earthquake activity (tremors) had been reported in eastern Connecticut. The potential for significant damage is considered minimal since a major earthquake in an area of low earthquake risk is unlikely.

The watershed is in the prevailing westerlies zone, an area subject to periodic coastal storms, including the tropical hurricane type that move up the Atlantic Coast.

The average annual precipitation is about 43 inches, distributed relatively uniformly throughout the year (1)<sup>1/</sup>

The mean annual temperature is 49°F and the mean monthly temperature ranges from 28°F in January to 70°F in July. The frost-free period, from May to October, averages 150 days (1).

Present land use in the watershed is 241 acres of cropland, 500 acres of forest land, 34 acres of pastureland, 766 acres of urban and buildup, and 123 acres of other.

Cropland is used primarily for corn and potatoes with smaller acreages of truck crops such as sweet corn, squash, tomatoes, and horseradish. Also, cropland is devoted to orchards in which apples, pears, and peaches are grown. The grasslands are established stands of fescues, brome, clover and alfalfa. Oak-hickory is the primary timber type with occasional stands of white pine, pitch pine and red maple. Public forest land is limited to two acres owned by Avery Street School.

Depletable mineral resources utilized from the watershed are sands and gravels. Ground water is used throughout the watershed for domestic purposes. Wells can be expected to produce approximately 25 gallons per minute with recharge being slow to moderate.

The surface water resources within the watershed consist of four miles of stream and six ponds. Avery Brook originates in a Type 7(2) wetland in the area of Miller Road and flows south to Avery Street where it is joined by Dart Hill tributary. Avery Brook then flows in a southerly direction through an urban area to its confluence with the Hockanum River. See Watershed Project Map, Appendix D.

Avery Brook is an unmodified perennial stream except the area from Avery Street to its confluence with the Hockanum River where it is classified as previously modified. All tributaries to Avery Brook are intermittent streams.

The state of Connecticut Water Quality Standards of 1970 does not designate the water quality classification of Avery Brook. However, the adopted standard for Avery Brook is listed as Class A. (3)

There is one large area of Type 7 wetland that is covered with woody plant growth of red maple, small white pine, and shrubby growth. This wetland area is in the upper part of the watershed above Miller Road and contains about 56 acres.

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<sup>1/</sup> Numbers in parentheses indicate references appearing in Bibliography, Appendix H.

Water quality data was collected during two periods, initially during November 1974 and again during July 1975. Water quality investigations were carried out using a HACH water test kit model DR-EL.

Five water quality sample stations were selected; four on Avery Brook and one on Dart Hill tributary. (See Tables A and B).

Station 1, Avery Brook (Miller and Ellington Road crossing)

Above Miller Road, Avery Brook exists in a riffle condition, immediately below the road crossing is a small pool, wider than the average channel width, followed by a riffle section. During the low-flow season, Avery Brook may have an intermittent flow above Miller Road. The stream ranges from one to three feet wide, with a depth of flow of one to three inches. Velocity during the investigation was less than .5 fps. Discharge was estimated to be 0.4 cfs. Stream bottom material consists of rock rubble, fine gravel and lesser amounts of silt. Sedimentation is slight to moderate, water flows clear with little or no apparent color. This section of stream has vegetation sufficient to shade about 75 percent of the stream. Both streambanks appear stable with little erosion. This stream is subject to periods of high turbidity derived from soil material eroded from cropland in the watershed. Little or no aquatic vegetation is found in the streambed. No pollutants were visible during the investigation period. Streamside vegetation consists of mixed hardwoods and white pine with a shrubby understory. Public access is limited by private ownership of land. The surrounding land use is forest land and residential.

Station 2, Dart Hill tributary, centerline of proposed structure

In the area of the proposed structure, the tributary is a series of riffles typical of a small upland stream. This tributary to Avery Brook is an intermittent stream, having little or no flow during the low-flow season. The stream averages 1 1/2 feet wide having a maximum depth of flow of 6 1/2 inches and an average depth of 2 inches. During the low-flow season, water is limited to pool areas with flow, if present, below ground. The stream bottom material is primarily sand and gravel with lesser amounts of cobble size stone and silt. Streambed sedimentation is moderate, however, both streambanks appear stable with little or no erosion evident. Both streambanks are vegetated. Water in the tributary does have a slight organic stain giving the water a slightly yellowish color. The stream shading is estimated to be about 75 percent. This stream is also subject to periods of high turbidity assumed to be caused by eroded soil material from cropland areas. Little or no aquatic vegetation is present in the streambed proper. Surrounding vegetation consists of mixed hardwoods, scattered conifers and shrubby type understory. Public access is limited by private ownership of land. Surrounding land uses include forest land and residential development.

### Station 3, Beelzebub Road crossing

Avery Brook is in a flat condition immediately above Beelzebub Road and enters into a wetland area below the road crossing continuing in a flat condition. The stream in this area has a perennial flow. The stream averages 3-4 feet wide having an average depth of flow of approximately 4 inches. Velocity during the investigation period was less than .5 fps. Discharge at this time was estimated to be 0.7 cfs. From Beelzebub Road to Avery Street, the stream passes through a considerable wetland area. Along this reach the stream receives considerable inflow from springs. Stream bottom material consists of a gravelly sandy mix with lesser amounts of rock rubble and cobble size stone and silt. Sedimentation at this station is moderate. There is little apparent color to the water, staining is slight. Stream shading along this station is estimated to be about 50 percent. Both streambanks appear stable, with little erosion and are vegetated. Little or no aquatic vegetation is present in the streambed. No pollutants are visible in the water flow. This section of stream is also subject to periods of high turbidity. Streamside vegetation consists of grasses, brushy type vegetation and mixed hardwoods. Public access is limited by private ownership of land. The surrounding land uses are forest land, wetland (Type 3 and 4), and residential.

### Station 4, Avery Brook, Avery Street crossing

Above Avery Street, the stream exists in a flat condition having passed through a wetland (Type 3 and 4). Downstream of Avery Street, the stream is in a riffle condition. Along this section, the stream maintains a perennial flow. The stream averages 5-6 feet wide having a depth of flow of 4-5 inches. Velocity was estimated to be less than .5 fps. Discharge was estimated to be about 1.0 cfs. Stream bottom material is predominately cobble size stone and rock rubble with lesser amounts of gravel and silt. Sedimentation in this vicinity is slight. The stream shade at noon is estimated to be 50 percent. Water at this station has an apparent grayish color. Both streambanks have slight erosion which contributes to stream loading. A light growth of filamentous algae attached to bottom material is present. No pollutants were visible during the investigation period. Streamside vegetation includes mixed hardwoods with a shrubby understory growth. Public access is limited by private ownership of land. The surrounding land is used for residential purposes, idle land and cropland.

### Station 5, Benedict Lane crossing near upper end of Avery Brook Pond

Below Avery Street to the outlet of the watershed, Avery Brook passes through a densely populated residential development. The stream passes under five road crossings through this residential area. The stream channel through this area has been previously modified. The stream bottom through this area is silty and sandy with cobble sized stone.

Flow is perennial and stream condition alternates between flat areas and riffle areas. Stream width is approximately 5-6 feet with a depth of flow of 4-5 inches. Sedimentation is moderate, at times heavy. Water flow is clear to slightly turbid. Streamside vegetation varies with development, however, it is largely willow trees and deciduous shade trees. The stream shading at noon is about 30-40 percent. Streambanks are largely stable with slight erosion. No pollutants were visible during the investigation period. Public access is not available and private dwellings and yards are close to the stream channel. The surrounding land use is primarily residential.

TABLE A  
PHYSICAL STREAM CHARACTERISTICS  
Avery Brook Watershed

Parameters	Sample Stations				
	I Avery Brook	II Dart Hill Tributary	III Avery Brook	IV Avery Brook	V Avery Brook
Channel condition	Natural	Natural	Natural	Natural	Manmade
Average width of flow	1-3 feet	1.5 feet	3-4 feet	5-6 feet	5-6 feet
Average depth of flow	1-3 inches	2 inches	4 inches	4-5 inches	4-5 inches
Bottom material	rubble/gravel	gravel/sand/ silt	gravel/sand/ silt	cobble/rubble/ silt	sand/silt
Stream sedimentation	slight	moderate	moderate	slight	moderate
Velocity	<0.5 fps	-	<0.5 fps	0.5 fps	0.5 fps
Discharge	0.4 cfs	-	0.7 cfs	1.0 cfs	1.0 cfs
Flow condition	Intermittent	Intermittent	Perennial	Perennial	Perennial
Stream shade	75%	75%	50%	50%	30-40%
Streambank condition/ erosion	Stable	Stable	Stable	Slight erosion	Slight erosion
Streamsides vegetation	Hardwood trees and shrubs	Hardwood trees and shrubs	Hardwood trees grasses/brush	Hardwood trees and shrubs	Shade trees and grasses
Adjacent land use	Residential/ woodland	Residential/ woodland	Wetland/ residential	Cropland/ residential	Residential
Land ownership	Private	Private	Private	Private	Private
Visible pollutants	None	None	None	None	None

Parameters investigated are displayed in Tables A & B. They include alkalinity, chlorides, color, specific conductance, hardness, nitrate nitrogen, phosphates, pH, turbidity, total dissolved solids, stream temperature and dissolved oxygen.

Dissolved oxygen levels are in the optimum range for warm and cold-water fish species; pH values fall within the normally unpolluted range of 6.5 to 8.5. Water temperatures at both fishery stations do not exceed levels which would be detrimental to cold-water fish. Free carbon dioxide levels are below the generally accepted upper limits of 25 mg/l. Specific conductance is a measure of the ion concentration in the water and can be related to the concentration of total dissolved solids. As specific conductance increases total dissolved solids increase. Conductivity varied between 120 and 150 micromhos/cm. The concentrations of total dissolved solids affect the chemical density of the environment of fish and aquatic life. Total dissolved solids are a source of nutritional ions for aquatic plants. Sources state for inland waters supporting a good mixed fish fauna, about 50% are under 169 mg/l and 95% are under 400 mg/l.(4)

Chlorides measured as chloride ions are important with respect to the salinity present in the system. Chlorides measured were not present in concentrations detrimental to aquatic life. The concentrations in Avery Brook ranged from 15 mg/l to 20 mg/l. Concentrations of chlorides supporting a good fish fauna are below 170 mg/l in 95% of inland waters in the United States.(4)

Nitrates and phosphates increased in concentration as the stream progresses through the watershed (Table B). This may be a result of the urban development within the watershed area. Concentrations are substantial in supporting growths of algae. Extensive growths were not observed at any of the sample stations. These nutrients, however, eventually reach Avery Brook Pond where nuisance growths may occur.

Turbidity and apparent color are both affected by suspended or colloidal matter. The turbidity and color units were low at Stations 1 through 3 and zero at 4 and 5. Color of stream water in Avery Brook is largely a result of staining due to organic compounds.

Hardness is generally correlated to dissolved solids and biological productivity. It is chiefly attributed to calcium and magnesium ions. These ions contribute to hardness and productivity. Hardness values less than 50 mg/l calcium are considered soft streams and usually not high in productivity. Avery Brook and its tributary would not be considered hard water streams.

SELECTED  
WATER QUALITY DATA\*

For Avery Brook Watershed

Date of Collection: November 26, 1974      Time: 1200 - 1500 hours      Air Temperature: 12°C

Parameters	Sample Stations				V Avery Brook
	I Avery Brook	II Dart Hill Tributary	III Avery Brook	IV Avery Brook	
Dissolved Oxygen mg/l	10	9	10	10	11
Alkalinity mg/l CaCO <sub>3</sub>	20.0	30.0	25.0	30.0	30.0
Chlorides mg/l Cl	15.0	15.0	15.0	15.0	20.0
Color A.P.C.S. Units	10.0	40.0	10.0	0	0
Conductivity umho/cm	140.0	120.0	150.0	150.0	150.0
Hardness mg/l CaCO <sub>3</sub>	50.0	70.0	50.0	60.0	70.0
Nitrate Nitrogen mg/l N	0.4	0.5	1.1	1.4	1.8
Phosphates mg/l PO <sub>4</sub>	0.2	0.4	0.8	0.8	1.1
pH Unit	6.8	7.5	7.2	7.6	7.5
Turbidity J.T.U.	10.0	5.0	5.0	0	0
Total Dissolved Solids mg/l	150.0	130.0	160.0	160.0	160.0
Water Temperature °C	9.0	9.0	10.0	10.0	10.0

\* Water quality data were derived through the use of a HACH kit Model DR-EL.

## PRESENT AND PROJECTED POPULATION

The watershed has an estimated population of 3,600 persons, of these, about 2,700 are considered urban residents. The watershed population is expected to be about 5,200 by the year 2020.

There are six minority families living in the watershed.

There are no low income residents in the watershed.

## ECONOMIC RESOURCES

The economic and social conditions of the watershed can be classified as primarily suburban with some agriculture. The unemployment rate is lower in the watershed than in many parts of Hartford County that had an average unemployment rate of 3.2 percent.(5) Likewise, the income level is higher than the average of \$11,638(5) for the Hartford region. Very few residents of the watershed actually obtain their livelihood locally, as most work throughout the greater Hartford region. The majority of the residents are salaried employees and only a few are self-employed. The phrase "bedroom community" very adequately describes the economic and social status of the watershed.

The town of South Windsor owns 364 acres of land within the watershed, the remaining 1,300 acres are in private ownership.

Farm enterprises consist primarily of potato and corn silage production. Smaller acreages are devoted to orchards and truck gardening. There are three family-type farms that are either wholly or partially within the watershed, averaging about 170 acres per unit.

The average crop-yields per acre in the watershed are: silage corn, 18 tons; potatoes, 500 bushels; and sweet corn, 1,150 dozens.

Most forest land uses are urban related for recreation and wildlife with wood production being of minor importance. Firewood is being cut in small amounts and can be marketed very readily. Several sawmills for larger materials are available in the vicinity of the watershed.

Agricultural land values of uplands and flood plains are unrelated to the land's productivity. Prices are dictated by the land's value as rural home lots; therefore, prices of \$3,000 to \$5,000 per acre are common. Since land values are directly related to the utilities and service already installed, some house lots have sold for \$10,000 to \$20,000 per acre.

About 13.5 miles of all-weather asphalt roads and streets interlace the watershed, so it is easily accessible from all directions.

#### PLANT AND ANIMAL RESOURCES

The principal wildlife species of the watershed include cottontail rabbit, ringneck pheasant, racoon, skunk, gray squirrel, ruffed grouse, woodcock, mourning dove, woodchuck, bobwhite quail, opossum, and an occasional red fox. The ringneck pheasant is the only species stocked in the area for the benefit of local sportsmen. Habitat for these and other game species is found primarily in the upper reaches of the watershed. Waterfowl utilize the few acres of surface waters for resting and feeding. Limited waterfowl nesting habitat is found along Avery Brook. Birdlife, primarily songbirds and small nongame animals utilize the entire watershed. Included are birds such as the cardinal, bluejay, robin, goldfinch, chickadee, sparrow, brown thrush, swallow, downy woodpecker, and common crow. Many of these birds are fed and observed during winter months by area residents. Small animals include the eastern chipmunk, mice, and other small rodents.

North of Beelzebub Road to Ellington Road, habitat for wildlife is primarily forest land including mixed hardwoods such as red maple, oak, hickory, and ash and occasionally conifers such as white pine. North of Ellington Road, habitat is mostly openland including cropland for silage corn and potatoes and grasses for pasture. A large Type 7 wetland (56 acres) is included in this area. South of Beelzebub Road to Avery Street is a mix of woody growth and cropland. South of Avery Street, the area is primarily developed for urban uses with limited wildlife habitat available in the form of short grasses, landscaping, and fruiting shrubs as well as scattered shade trees.

Avery Brook supports a low quality cold-water fishery. The tributary does not support a fishery. A fishery inventory utilizing electrofishing techniques along a 600-foot sample reach was conducted during July 1975, on Avery Brook and the Dart Hill tributary.(6) Fish species collected in Avery Brook included brook trout and white suckers. Electrofishing of the Dart Hill tributary produced no fish indicating it does not support fish during the low-flow season. The inventory data, Table C and D, indicate Avery Brook to be a relatively unproductive stream having an estimated production of 12.9 pounds of native brook trout per stream mile. Fish diversity in Avery Brook is poor with the majority of fish small brook trout in the 2.0 to 6.0-inch class range. The average size brook trout is 2.5 inches long averaging .14 ounces in weight.

Data indicate a lack of "catchable" size fish in the stream. The large number of fish collected coupled with the small size indicate the ecological niche usually occupied by minnows such as blacknose dace is filled by small brook trout. This reach of stream may be utilized for fall spawning activities and raising young of the year. The small size of the stream limits available habitat and is largely responsible for the low quality fishery.

The existing stream habitat is inadequate to justify a put-and-take trout fishery.

Aquatic invertebrates collected during the fishery survey were gathered from 20 randomly picked stones and identified to order. See Table E.

Invertebrate density in Avery Brook is low with only three taxa identified, however, of these, trichopter dominates and is typical of clean water streams.

Avery Brook tributary displays a high diversity of invertebrates with a dominance of midge larvae.

From the diversity present in both streams, one can conclude they are essentially free of organic pollutants.

The relatively small number of taxa and numbers of individuals in Avery Brook may contribute to the limited fishery.

No rare or endangered species are known to be present in the watershed.

TABLE C  
SELECTED STREAM CHARACTERISTICS

at Fishery Sample Stations

Parameters	Avery Brook	Dart Hill
Temperature Water °C	17.5° C	20.8
Turbidity JTU	-	-
pH unit	7.4	7.5
Dissolved oxygen mg/l O <sub>2</sub>	7 mg/l	8 mg/l
Carbon Dioxide mg/l CO <sub>2</sub>	18 mg/l	4 mg/l
Alkalinity (methyl orange)	3 grains CaCO <sub>3</sub> /gal	3 grains CaCO <sub>3</sub> /gal
Stream channel condition	Natural	Natural
Stream width		
Average water flow	4' 3"	1' 9"
Average channel width	7' 1"	7' 3"
Maximum water depth	7.80"	6.35"
Average water depth	3.40"	0-4 inches
Velocity	≤ fps	0
Discharge	≤ cfs	0
Stream flow	Perennial	Intermittent
Number pools in sample	16 pools, 12 riffles	8 pools, 12 riffles
Total footage in pools	157 feet	93 feet
Pool riffle ratio	16:18	8:12
Bottom material		
Primary material	Gravel	Cobble
Secondary material	Sand and silt	Sand and Silt
Stream sedimentation	Moderate	Moderate
Pollutants	None visible	None visible
Streambank condition	Stable	Stable
Stream shade at noon	80%	75%
Streamside vegetation	Mixed hardwoods and shrubs	Mixed hardwoods and shrubs
Adjacent land use	Forest	Forest
Land ownership	Private E-27	Private

TABLE D

## Summary of Fishery Data

## Avery Brook

Date of Collection: July 9, 1975		Electroshocking efficiency: 85%	
SPECIES:		<i>Salvelinus fontinalis</i>	Catostomus commersoni
ITEM	RESULTS	RESULTS	RESULTS
Total number of fish collected	162	-	10
Total weight of fish collected	1.3 pounds (589.4 grams)	1.9 ounces (55.4 grams)	
Range in length of fish collected	1.7-6.0 inches (45-152 mm)	2.0-4.3 inches (52-110 mm)	
Weight range of fish collected	.06-1.6 ounces (1.6-44 grams)	.06-.6 ounces (1.6-18.0 grams)	
Projected number of fish in sample reach (based on 100% electrofishing efficiency)	192	12	
Projected weight of fish in sample reach (based on 100% electrofishing efficiency)	1.5 pounds (695.5 grams)	.14 pounds (65.4 grams)	
Projected fish production	25 pounds/acre	3.52 pounds/acre	
	12.9 pounds/mile of stream	1.8 pounds/mile of stream	

TABLE E  
Avery Brook Watershed  
Aquatic Life

Aquatic Invertebrates	Avery Brook Number of Individuals	Dart Hill Tributary Number of Individuals
Common Taxa Name		
Coleoptera (beetles)	3	12
Trichoptera (caddisflies)	199	4
Gastropoda (snails)	3	46
Megaloptera (dobson fly)	Abundant in Vegetation	1
Odonata (dragonflies)		6
Diptera (midgees)		375
Hirudinea (leeches)		5

Note: Aquatic invertebrates were collected from 20 randomly picked rocks and identified to order.

Other aquatic life observed

Bullfrog	X	X
Redback salamander	X	X
Crayfish	X	
Diving beetle		X
Water boatmen		X
Water strider		X

## RECREATIONAL RESOURCES

Recreation within the watershed is limited to a 3.5-acre pond below Benedict Lane that is controlled by a landowners association. This pond offers some warm-water fishing for local youngsters and other uses such as birdwatching. There is no public access to this pond.

## ARCHAEOLOGICAL AND HISTORICAL RESOURCES

The Connecticut Historical Commission has conducted an on-site inspection of the watershed for sites and structures of historical importance. Two houses have been identified as having sufficient historical value to warrant protection against damages or loss. These two houses, located on Avery Street and on Dart Hill Road, are not near the structure sites and will not be adversely affected by this watershed project. The National Register of Historical Places does not carry any listing for the watershed. See Appendix F.

An investigation of the archaeological survey site records produced no known sites in the watershed area. Local residents have made stray finds in the watershed area but none in the impacted area. An on-site survey revealed no cultural information in the impacted area. See Appendix F.

The National Park Service will be notified if any previously unidentified evidence of cultural values are discovered during detailed investigations or construction and the procedures set forth in PL 93-291. Since this is a federally assisted local project, there will be no change in the existing responsibilities of any federal agency under Executive Order 11593 with respect to archaeological and historical resources.

## SOIL, WATER AND PLANT MANAGEMENT STATUS

The trend in land use is from farm and forest lands to an urban "bedroom community." Potential for erosion and sediment will increase as farm and forest lands are urbanized.

The Hartford County Soil and Water Conservation District has expanded its land treatment program to include preventing those adverse conditions that develop with urbanization. Technical assistance will be provided to local governing bodies, developers, contractors, and individuals prior to, during, and after development to minimize erosion and sedimentation. About eight percent of the land within the watershed is under district agreement. There are five district cooperators in the watershed, of which three have conservation plans. The three cooperators with plans have applied 97 percent of the planned conservation practices.

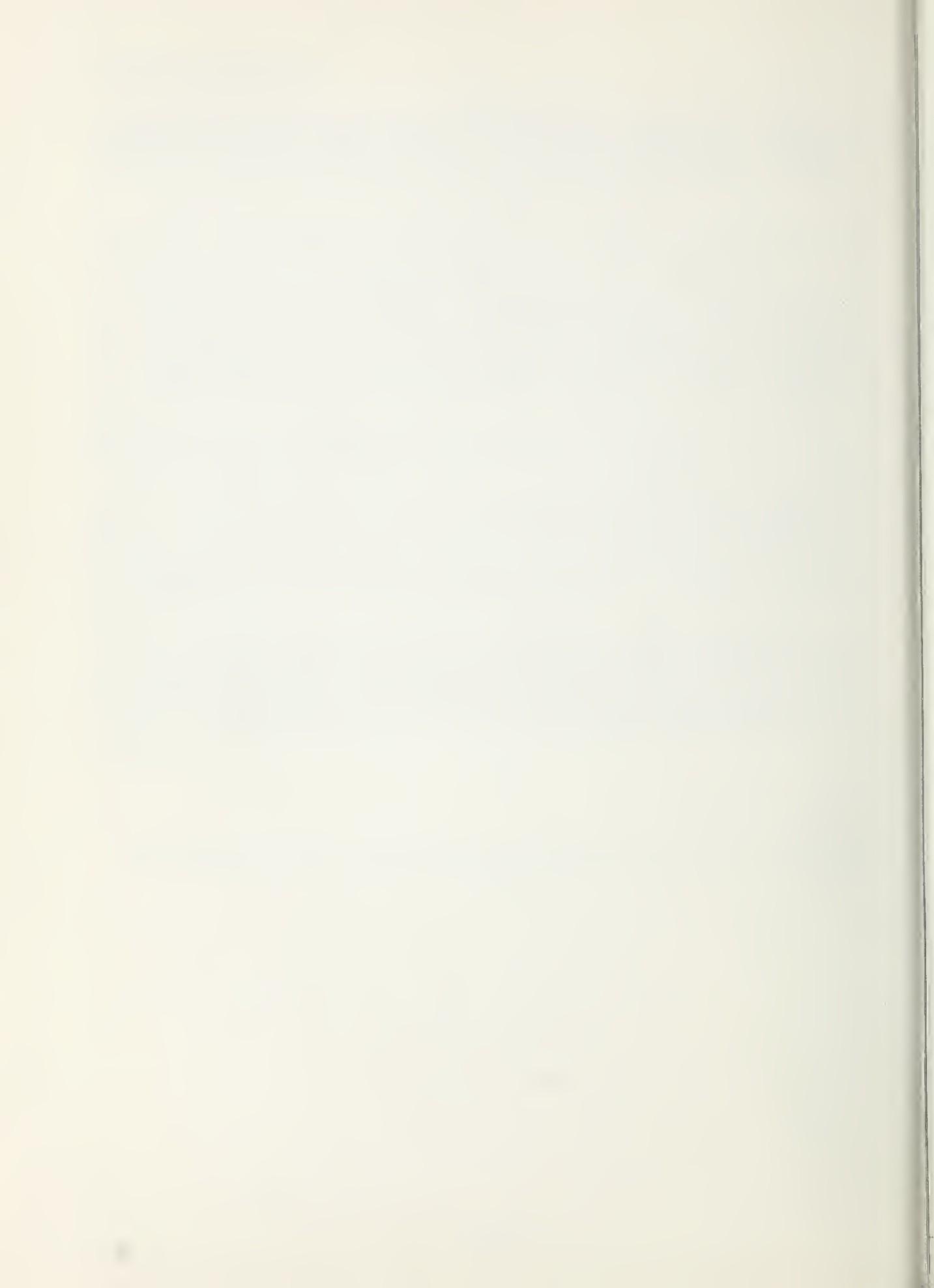
Adequate fire protection is provided by the Department of Environmental Protection in cooperation with the United States Forest Service through the Clarke-McNary Cooperative Fire Protection Program. No forest fires have been reported in the watershed in the past five years.

State-Federal Cooperative Forestry Programs presently providing assistance in the area include: Cooperative Forest Management (CFM), Cooperative Forestation (CM-4), and Cooperative Forest Insect and Disease Management.

Zoning regulations are in effect for the area and subdivision plans must have town approval and show evidence that resource conservation is properly instituted as a part of the subdivisions. The Hartford County Soil and Water Conservation District reviews and comments on subdivision plans as requested by the town.

## PROJECTS OF OTHER AGENCIES

There are no other projects for the development of water resources, by other agencies, within the watershed.



## WATER AND RELATED LAND RESOURCE PROBLEMS

### LAND AND WATER MANAGEMENT

The undeveloped portions of the watershed are rapidly changing to urban use. The economic setting is most likely the major factor resulting in the reduction of farm and other open space lands. This has generated a need that planning bodies, developers, contractors, and individuals be aware of local problems that can arise as these land use changes take place. They should be aware of the opportunities of proper land use to assure an orderly growth compatible with conservation use and maintenance of a high quality environment.

There is need to accelerate the traditional job of assisting those making decisions affecting land and water use. It is important that technical assistance be given for implementation of controls to minimize erosion and sediment especially during construction.

### FLOODWATER DAMAGE

Residential properties along Avery Brook in the area extending from Benedict Lane to Avery Street and those east of the junction of Woodland Drive and Beelzebub Road along Woodland Drive experience flooding yearly. This flooding is primarily of a nuisance nature where some street ponding occurs and out-of-bank flooding starts to inundate yards and gardens adjacent to the stream. In the area between Benedict Lane and Manor Drive, a two to three-year frequency storm will cause direct flooding to walk-out basements. These basements are an integral part of the living quarters of each house. Many include recreation rooms and other finished rooms and furnishings that are subject to flood damages.

A 100-year frequency storm will cause direct flooding to 33 basements, some to depths of three feet. This will cause substantial damage to physical structure and contents of these homes. A total of 67 residential properties and an area of 44 acres will be affected by a storm of this magnitude. This storm would inundate about 6,000 feet of streets, some to depths up to three feet. See Project Map, Appendix D.

## EROSION AND SEDIMENT DAMAGE

Erosion problems within the watershed are primarily from sheet erosion. The major sources of erosion are cropland and areas undergoing urban development. Soil loss per acre, from untreated cropland is 8.9 tons per year and 25 tons per year for construction areas.

The erosion on cropland results in a loss of fertility and higher production costs and increases the construction costs of urban development.

## PLANT AND ANIMAL PROBLEMS

The land use changes taking place in this watershed and those anticipated are from farms and forest land to suburban and a few rural residences. In these areas affected, the plant community will be subject to complete change or near complete change. Here forest land and/or cropland will be replaced with buildings, lawn grasses, and shrubs. Some of the problems that usually occur when these changes take place are as follows: The first is where the immediate area may undergo complete alteration resulting from the digging, mixing, relocation, and compacting of the soils causing a total alteration of their natural characteristics. The second problem is that permanent vegetative cover is not re-established on the disturbed areas as soon as possible. Exposed, unprotected soils are the most susceptible to the erosive action of wind and water.

Land use changes will affect the animal resources where the changes occur. With these changes, only the wildlife species that are adapted to or compatible with man will stay in the area. Wildlife that might be expected to increase in number because of this change are the various songbirds that adapt to man's infringement. During the construction period and prior to the re-establishment of vegetation, sedimentation will increase contributing pollutants to the stream system. These will be detrimental to the fishery resource present in the area. However, this will be a short-term occurrence and the net adverse effect will be minor.

Several wetland areas, although small, could be improved to enhance wetland wildlife habitat for waterfowl by controlling vegetation and by the introduction of other suitable water management measures. Preservation of the wetland areas is important for the natural retention of floodwater and for the extension of the streamflow volume.

Wildlife habitat for game birds and animals will be reduced with residential encroachment. Songbird habitat may be increased by residential landscaping, utilizing trees, shrubs, and vines.

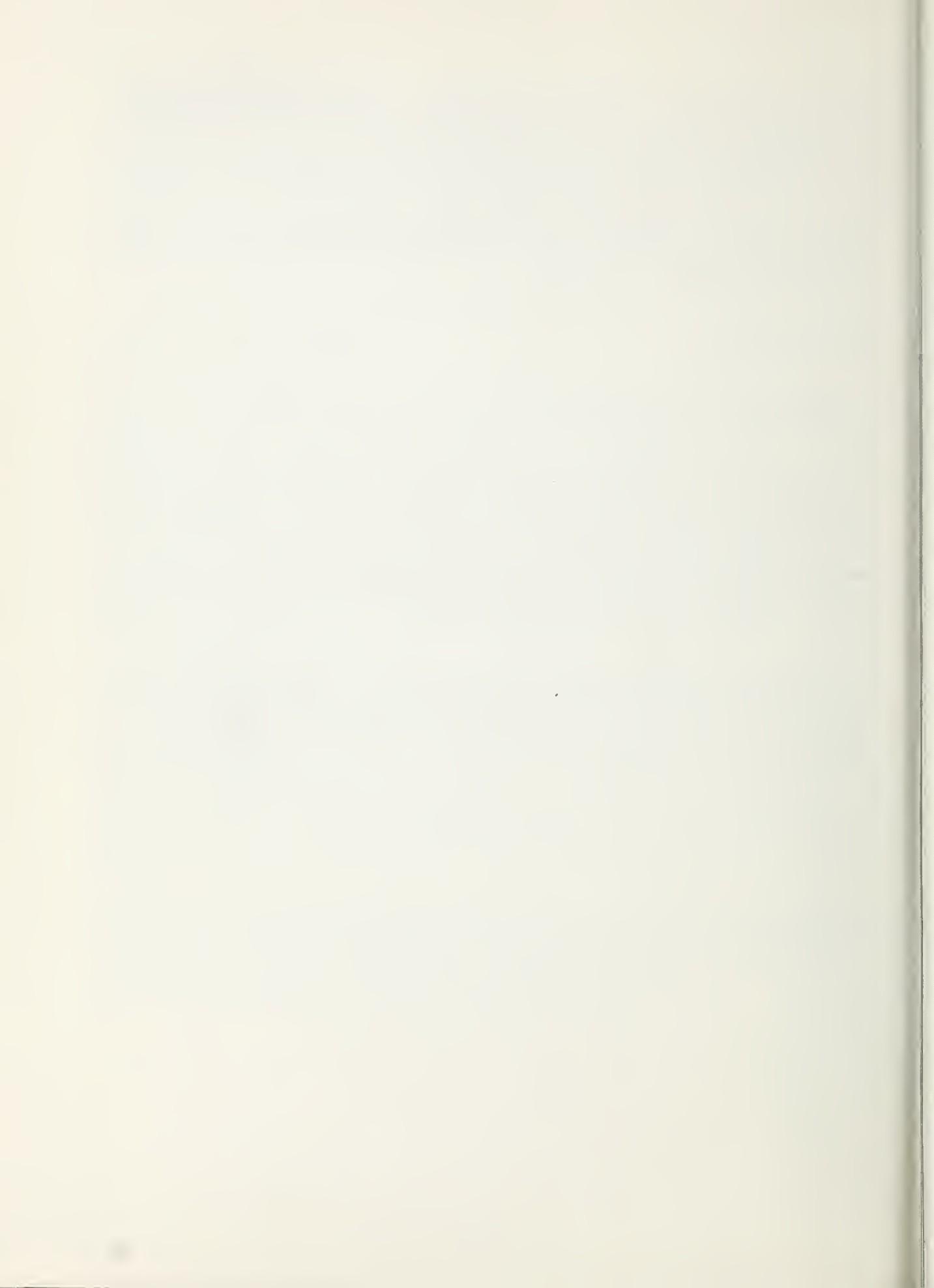
The poor quality of fish habitat in Avery Brook and its tributary limits the size of the fishery. The conditions in both streams which contribute to this situation include, summertime low-flows, which limit living space, increase hazards of high temperature and decrease availability of cover. Low-flows over extended periods can reduce the drift of food, even damaging the food resource.

No endangered plant or fish and wildlife species are known to exist in this watershed.

#### ECONOMIC AND SOCIAL PROBLEMS

The three farms in the watershed are family operations. Here as in the surrounding area the major economic problem for the family farmer is the cost-price squeeze. Land values for suburban and rural residential use are inflating. Cost of labor, machinery and fertilizers continue to rise. Interest rates and taxes are taking a larger portion of farm earnings making continuance of farming increasingly difficult. Therefore, the displacement of the farmland by the encroachment of the residential development is expected to continue.

The appeal of the rural social order in the northeast is increasing daily. Many persons in searching for relief from tensions created by the rapid urbanization of the past few decades are anxious for a little space of their own. This social situation, which is becoming common throughout the northeast, will maintain the trend of converting open space lands to residential uses.



## RELATIONSHIP TO LAND USE PLANS, POLICIES AND CONTROLS

Connecticut's Office of State Planning prepared a proposed Plan of Conservation and Development for Connecticut, dated January 1973. This proposed plan presents a framework of ten policies and recommendations for the future use of Connecticut's land and water resources. It suggests steps to be taken by all levels of government to ensure that conservation and development needs are more carefully balanced. These ten policies are as follows:

Policy No. 1: Establish and protect sufficient water supply sources to meet future water supply needs.

Policy No. 2: Provide a wide variety of high quality outdoor recreational opportunities to all citizens with highest priority given to the purchase and development of facilities in and near the state's urban areas.

Policy No. 3: Protect the scenic, historic and natural resources of Connecticut from premature, uncontrolled or incompatible development.

Policy No. 4: Protect rivers and lake shores, flood plains and coastline from environmentally destructive alterations and development.

Policy No. 5: Direct urban development to those areas identified as suitable for urban development, preferably close to existing urban, commercial and employment centers.

Policy No. 6: Encourage urban development to be at sufficient densities for the economic provisions of services.

Policy No. 7: Promote staged, continuous development within areas suitable for urban development.

Policy No. 8: Encourage decisions relating to major conservation and development actions to be made in accordance with the locational guide maps of the plan, and with the key policies of conservation and development.

Policy No. 9: Encourage the use of the plan of conservation and development as a guide in reviewing projects and proposals and in assessing the need for amended or new legislation.

Policy No. 10: Encourage local participation in conservation and development activities.

The Avery Brook Watershed Plan does not conflict with any plans of the Capitol Regional Planning Agency or the town of South Windsor. The plan is compatible with the Clean Air Act and the Federal Water Pollution Control Act.

The town of South Windsor has subdivision regulations to control erosion during construction. It also has a regulation that mandates that the developer of a subdivision provide means to prevent any increase in storm peak discharge resulting from the proposed change in land use.

## ENVIRONMENTAL IMPACTS

### CONSERVATION LAND TREATMENT

During the installation period of this project, conservation land treatment measures will be applied on 750 acres of watershed land. The remaining watershed lands will receive partial conservation land treatment during the installation period. Reduction of runoff from a 100-year storm by land treatment will be six percent and the runoff reduction of a two-year storm will be 11 percent. Erosion reduction is a result of adequate land treatment. Treated watershed land has an annual erosion rate of 2.78 tons of soil per acre, while the erosion rate of the watershed land without treatment is 3.77 tons of soil per acre. Cropland erosion is primarily the sheet type.

Land treatment is estimated to reduce the average sediment pollution to 0.5 mg/l, or 26 percent, at the mouth of the watershed.

Reduced runoff from areas of intensive use such as cropland, pasture, and urban areas will reduce the nutrient and chemical content of runoff water by a comparable percentage.

Treatment of cropland, pastureland, forest land, urban areas, and other lands as proposed in this project will reduce runoff and minimize erosion. In addition to its value for watershed protection, land treatment will provide many other social and economic benefits. It will help keep the agricultural enterprises operating more economically and help delay the land use change from agriculture to urban. The improved quality of forest land and wood lots will benefit both man and wildlife. Improved wildlife habitat conditions necessary for the production and preservation of wildlife will be an important benefit from land treatment. This will establish and ensure a variety of vegetation with food and cover value for wildlife. Additional escape, nesting, rearing and loafing cover will be provided by woodland management, wetland management, and maintaining native vegetation. The emphasis on quality land and water will help maintain the scenic beauty and character of the watershed. Of particular significance will be outdoor recreational benefits to land-owners and the public.

The technical assistance to be provided will be instrumental in achieving desired land treatment goals; enable planning bodies to give adequate consideration to soils, water, and other natural resources in developing long-range use plans; and enable orderly translation of these plans into action. During the installation period of this project, it is expected that guidelines, procedures, and lines of communication will have been established to guide future planning in allocations and uses of resources which will result in a healthy economy and a high quality environment.

## NONSTRUCTURAL PROJECT MEASURES

The town will continue to work toward land use planning that will use, but not abuse, watershed resources. The Hartford County Soil and Water Conservation District, Capitol Regional Planning Agency and state agencies are also contributing technology for proper resource management.

## STRUCTURAL MEASURES

The combined effect of installing land treatment and the two floodwater retarding structures will control the runoff from 65 percent of the watershed. The structures have the combined capacity to detain 313.5 acre-feet of floodwater thereby controlling runoff from storms up to the 100-year event. The storm discharge at the lower end of the damage area will be reduced from 1360 cfs to 550 cfs. This will decrease the area inundated from 44 acres to 10 acres in the event of a 100-year storm and reduce flood damages to 67 residential properties in the watershed.

The structures will protect all but five homes from all storms up through the 100-year storm. These five homes will be floodproofed to protect them from the 100-year storm. Remaining flooding with the project will be to about 700 feet of streets and to lawns and gardens. The two structures will reduce flood stages an average of two feet throughout the damage area.

The installation of the structure at Site 1 will destroy a one-third-acre pond and 150 feet of stream channel and require 0.7 acres of cropland and 1.0 acres of pastureland. Site 2 will destroy 165 feet of stream channel and require 1.5 acres of forest land. The temporary flood pool at Site 1 will periodically inundate 9.9 acres of cropland, 3 acres of pastureland, 8.4 acres of Type 2 and 3 wetland, 8.5 acres of forest land, 4.7 acres of urban land, and 4,400 feet of stream channel. It will require the floodproofing of two houses, three lawns and driveways and 800 feet of town road and town sewer line. The temporary flood pool at Site 2 will periodically inundate 12.2 acres of forest land, 0.6 acres of urban land, 2.3 acres of Type 7 wetland, and 1,500 feet of stream channel. Public access will be provided to the 49.6 acres of open space created by the flood pools at sites 1 and 2.

At each dam site, the embankment, the exposed borrow area, and the emergency spillway will be re-established to a vegetative cover. The one-third-acre pond will be rebuilt 250 feet downstream. The two structures will not have any impact on ground water recharge as surface water will only be retarded for a short period of time. The project is not expected to cause any relocations. If any relocations are required, they will be carried out under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Construction activities at Site 1 will temporarily increase the amount of sediment and erosion. Measures such as sediment basins will be installed in the construction area. The computed volume of sediment delivery to the watershed outlet (Hockanum River) is 2.5 tons during construction at Site 1 and one ton during construction at Site 2. This is based on 80 percent trap efficiency of properly maintained debris basins.

An archaeological survey conducted by the Connecticut Archaeological Survey, Inc. found no record of any archaeological finds in the watershed nor did they find any in their field investigation. The Connecticut Historical Commission in their investigation of the watershed found no structures of historical significance. Should a find be made, the National Park Service will be notified in accordance with PL-93-291 in order to preserve or salvage the find.

The installation of the two structures will create five man-years of employment during construction.

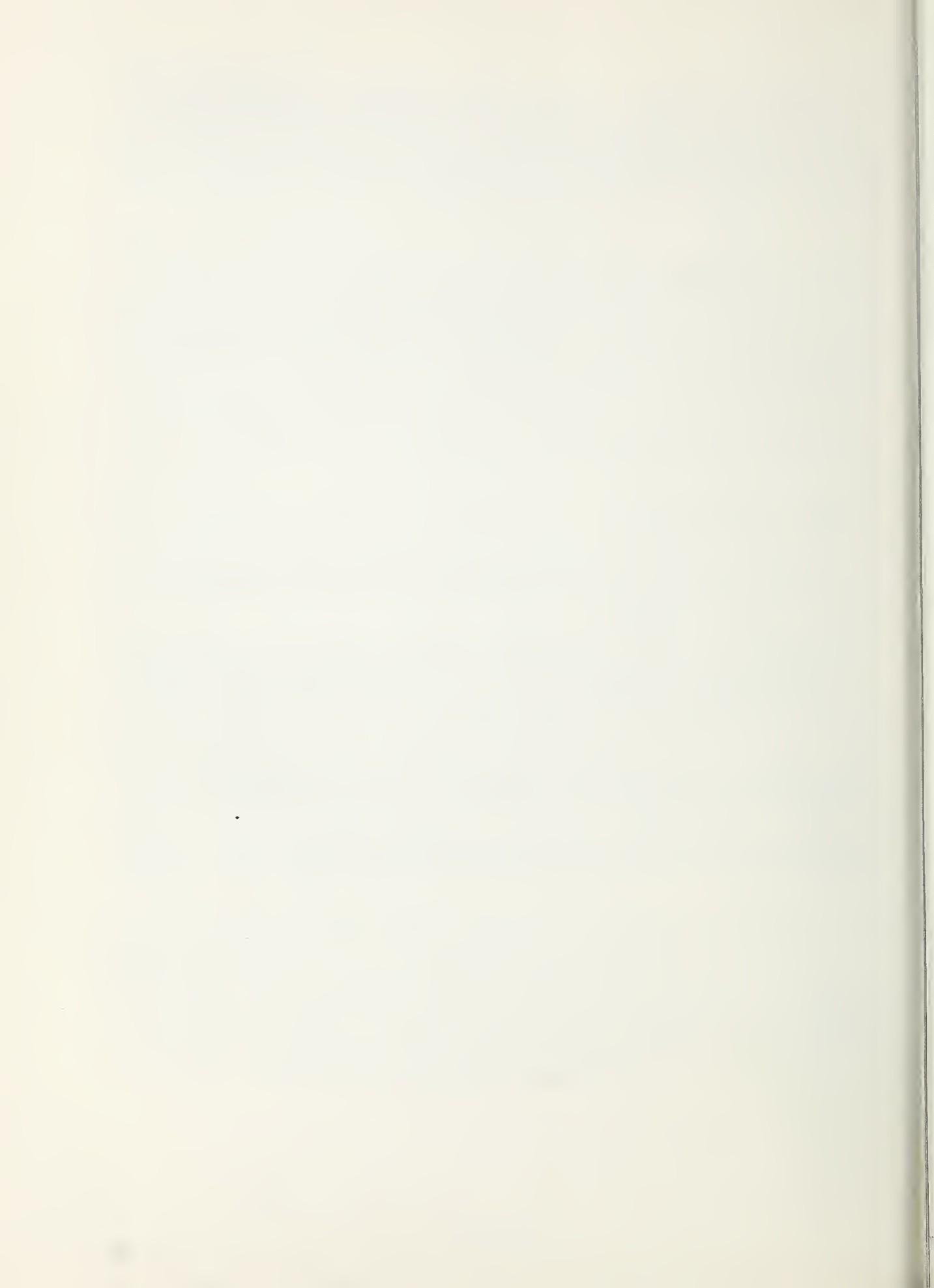
#### ECONOMIC AND SOCIAL

The project will reduce flood damages to 67 families who live in the flood plain, reducing annual flood damages by \$50,900, and retain 59 acres of land in open space.

The construction of the two floodwater retarding structures will create five man-years of employment over a two-year period and the operation and maintenance of the structures will create about one month of work annually during the life of the structures.

Some disruption of the operation of a family-type farm will take place during the construction of the structure at Site 1 and the cropland within the temporary flood pool will receive periodic flooding.

No minorities or low income families will be adversely affected by the installation of the two floodwater retarding structures.



## FAVORABLE ENVIRONMENTAL IMPACTS

1. Land treatment will reduce floodwater runoff by six percent, and the erosion rate will be reduced to 2.78 tons per acre. Sediment will be reduced to 0.5 mg/l at the mouth of the watershed.
2. The dams, pool area, spillway, and inseparable adjacent lands will provide 59 acres of permanent open space in an urbanized area.
3. The two sites will trap 20.5 acre-feet of sediment during the first 50 years.
4. Land treatment will reduce floodwater runoff from a 100-year storm by six percent, sediment by 26 percent.
5. Sites 1 and 2 will reduce floodwater damages by 86 percent.
6. The flood plain area will be reduced by 77 percent, benefiting 67 homeowners and the town.
7. Installation of two structures will create five man-years of employment.
8. Public health will be improved by reducing flooding of old abandoned septic systems.
9. An additional 0.77 million dollars will enter the economy directly.
10. Vegetation will be reestablished on 4.8 acres of construction area at Sites 1 and 2 which will benefit wildlife by creating food, cover, and increase habitat diversity.
11. Commitment of 49.6 acres of flood pool uses at Sites 1 and 2 will provide wildlife habitat and public access for passive recreation.

1

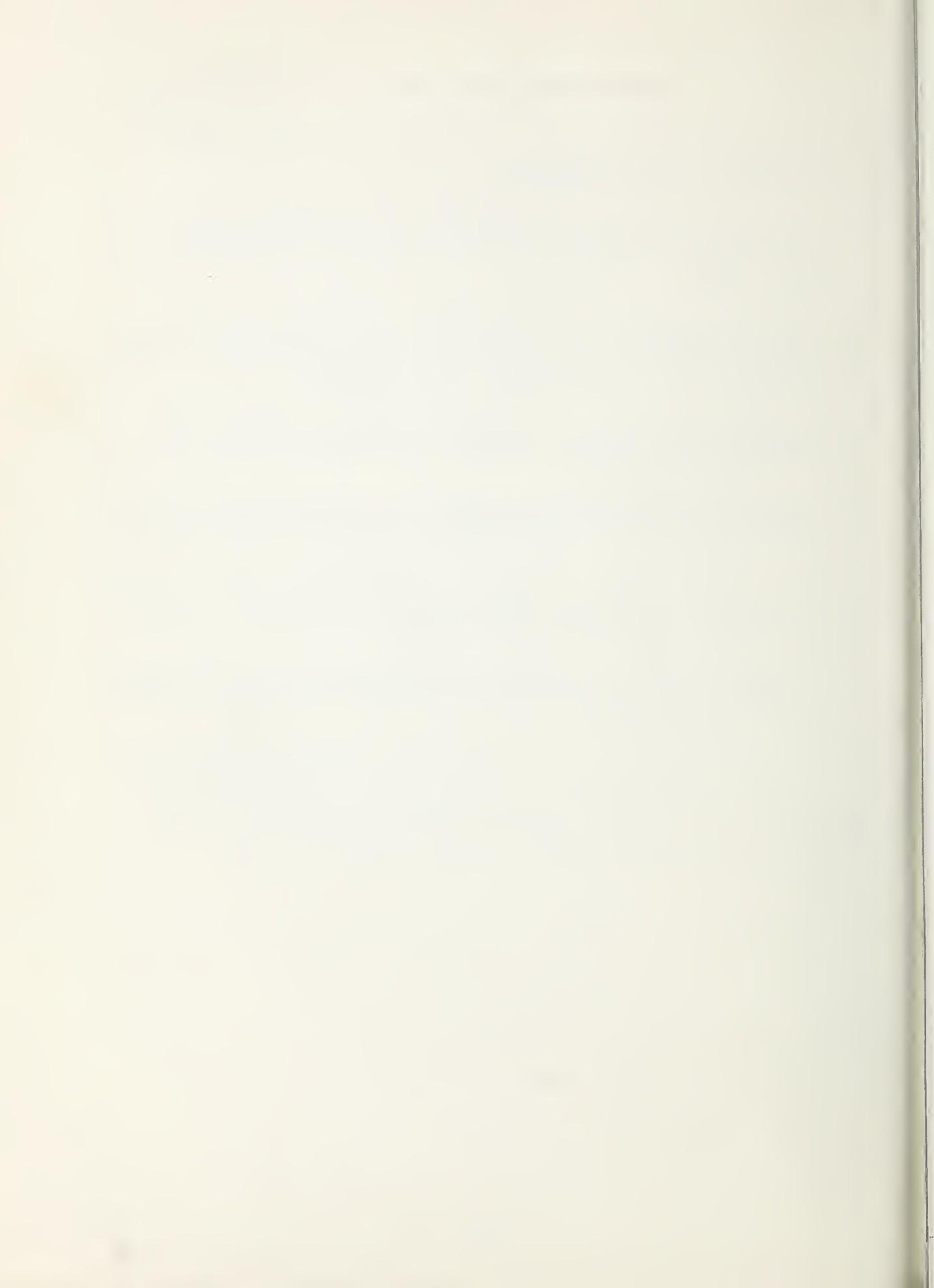
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3

4

## ADVERSE ENVIRONMENTAL EFFECTS

1. The project will restrict the use of 59 acres of land which is presently in private ownership.
2. Temporary inundation of 15.1 acres will occur at Site 2 from a 100-year frequency storm. Of this 15.1 acres, 12.2 acres are forest land, 2.3 acres are Type 7 wooded wetland, and 0.6 acres of urban land.
3. Temporary inundation of 34.5 acres will occur at Site 1 from a 100-year frequency storm. Of this 34.5 acres, 8.5 acres are forest land, 4.7 acres are urban land, 3 acres are pasture, 9.9 acres are cropland, and 8.4 acres are Type 2 and 3 wetland.
4. Installation of Site 1 will change 1.7 acres of land into earth embankments and spillways and Site 2 will change 2.5 acres of forest land to openland.
5. Storage of floodwater will temporarily inundate up to 4,400 feet of stream channel at Site 1 and 1,500 feet of stream channel at Site 2.
6. Installation of Site 1 will destroy a one-third-acre warm water pond.
7. Installation of the dams at Sites 1 and 2 will destroy 315 feet of stream fishery and associated food chains.
8. The construction will temporarily increase the stream turbidity and sediment load. And the equipment being used will increase the noise level and air pollution.
9. The installation of the dam at Site 1 will disrupt the operation of a family-type farm during construction and at times of flooding.
10. The operation of the floodproofing closure assemblies will cause some inconvenience to family living at times of flooding.



## ALTERNATIVES

### Accelerated Land Treatment

This alternative would be the same as the land treatment phase of the selected plan which is described under Planned Project. The cost of accelerated land treatment would be about \$114,900.

Land treatment alone would not meet the Sponsoring Local Organization's objective of providing flood protection. Essential treatment of the watershed lands would be provided and the benefits to fish and wildlife habitat resulting from the conservation land treatment would accrue.

This alternative would require no relocations and land use changes would continue at the present rate. Only the effects of conservation land treatment and land use changes would produce modifications to the existing environment.

### Accelerated Land Treatment Supplemented by Acquisitions of all Flood Plain Property

Consideration was given to relocating all the homes that are subject to floodwater damage and establishing a strembelt or natural corridor in place of the houses. This alternative has the effect of leaving the upstream watershed area untouched. The flora and fauna would be changed only as the land use would change. The acquisition of the homes would displace over 100 people. Flood damages would be eliminated if all damageable properties were removed from the flood plain. The estimated cost of this alternative would be about one million dollars.

The removal of the structures in the flood plain would, in effect, eliminate the flood problem. The relocation of the people would cause a complete social upheaval in this segment of the watershed. The area cleared of residential housing could be developed into an aesthetically appealing strembelt.

### Accelerated Land Treatment Supplemented by Flood Plain Zoning, Flood-proofing and Flood Insurance

These three items can be combined to provide an alternative to the Planned Project. The zoning of flood plains to prohibit new construction or reconstruction would minimize escalation of flood damages. Floodproofing of all applicable properties would reduce damages to

the indirect and mop-up type. The unprotected properties and those which have floodproofing would need additional financial protection. This need could be provided by flood insurance. The acquisition of flood insurance would in effect spread flood damage costs to flood plain occupants over a number of years.

The combination of these three management and structural tools would reduce flood damages to the homes and leave the flood plain virtually undisturbed if floodwalls are not used as a type of floodproofing. The cost of operation and maintenance of floodproofing and the cost of flood insurance would be both a private and public expense and could exceed one million dollars. In addition, there would be a continued threat of loss of life, periodic disruptions of home life and the resultant clean up when floods occur.

#### Accelerated Land Treatment and Structural Measures

The land treatment phase of this alternative is the same as that described under Planned Project. All costs, benefits, and effects would be the same.

The structural measures considered were different combinations of structural sites, diversions, and channel work. The combinations are as follows:

Structural alternative 1: three floodwater retarding structures. Two sites (referred to as Sites 1 and 2) are to be located just above the damage area. The third site (referred to as Miller Road site) is just north of Miller Road.

Sites 1 and 2 will provide flood storage capacity needed to contain the 100-year storm inflow. These structures are described in the selected plan. The Miller Pond site, which is in series with Site 1, has about a 200-acre watershed. Construction of this structure would eliminate the minor road flood damage that occurs between the two sites and would reduce the size of the structure at Site 1. This site is located on an area of Type 7 wetlands, where it would require a dam over a quarter of a mile long and six to eight feet high. This structure could be developed to provide some value as a fish and wildlife pool. The three structures would cost about \$800,000.

Structural alternative 2: three floodwater retarding structures plus diversions. Two sites (referred to as Site 1A and 2) are located in the same places as Sites 1 and 2 of the selected plan. Site 2 is unchanged and Site 1A would be smaller than Site 1. Site 3 would be in series with and about 1,600 feet upstream of Site 1A.

This proposal was made in an effort to eliminate the need to displace or disturb residential dwellings in the Site 1 pool area. However, Site 1 could not be lowered enough to avoid the dwellings and still provide adequate flood protection. Two diversions would be installed to reduce the remaining damages caused by runoff from the uncontrolled areas below the structures. The diversions would, however, eliminate flooding to only three of the five homes that would have remaining flood damage with structures alone. This cost was estimated to be about \$1.1 million.

Structural alternative 3: This alternative consists of two floodwater retarding structures and two diversions. The floodwater retarding structures, Sites 1 and 2, are the same as those in the selected plan. The two diversions convey runoff into Site 1 from the uncontrolled areas east and west of the sites. The runoff from the diversions would require increasing spillway elevation and top of dam at Site 1. The diversions would function as and provide the same benefits as in alternative 2. The cost of the diversions would be four times the benefits obtained from putting them in. The total cost of this alternative would be \$930,000.

Structural alternative 4: Vegetative channel. A study was also made of a vegetative channel which would convey the 100-year storm discharge through the damage areas. This would require the construction of 4,000 feet of earth channel of a size that would destroy the aesthetics of the area. It would eliminate a major portion of the back yards and as a result, restrict many of the outdoor family activities that are enjoyed in the area. This channel would also require the enlargement of and therefore the replacement of three street bridges, three roadway culverts and several hundred feet of underground conduit. In portions of the area protected, the top of channel would be above the adjacent ground elevation. This would require the construction of an earth dike which would necessitate the taking of additional back yard land. This alternative would eliminate the flood damages but would not reduce erosion nor decrease storm peak runoff. During periods of high flood flow, it could be a hazard to children. The cost of such a channel would be over \$500,000.

Structural alternative 5: Concrete channel or pipeline. A paved water-course (either an open or closed conduit) could eliminate the major flood damage and require less land area than the vegetative channel. Most of the trees and other vegetation along the brook would be destroyed during construction. The placement of a lined channel through this confined area would permanently destroy much of the aesthetics of the area in its present state. A lined channel would be less desirable than a manmade vegetative channel from a fishery and wildlife standpoint. The cost of a lined open channel would be \$750,000 and a closed channel would be in excess of \$1,000,000.

### No Project

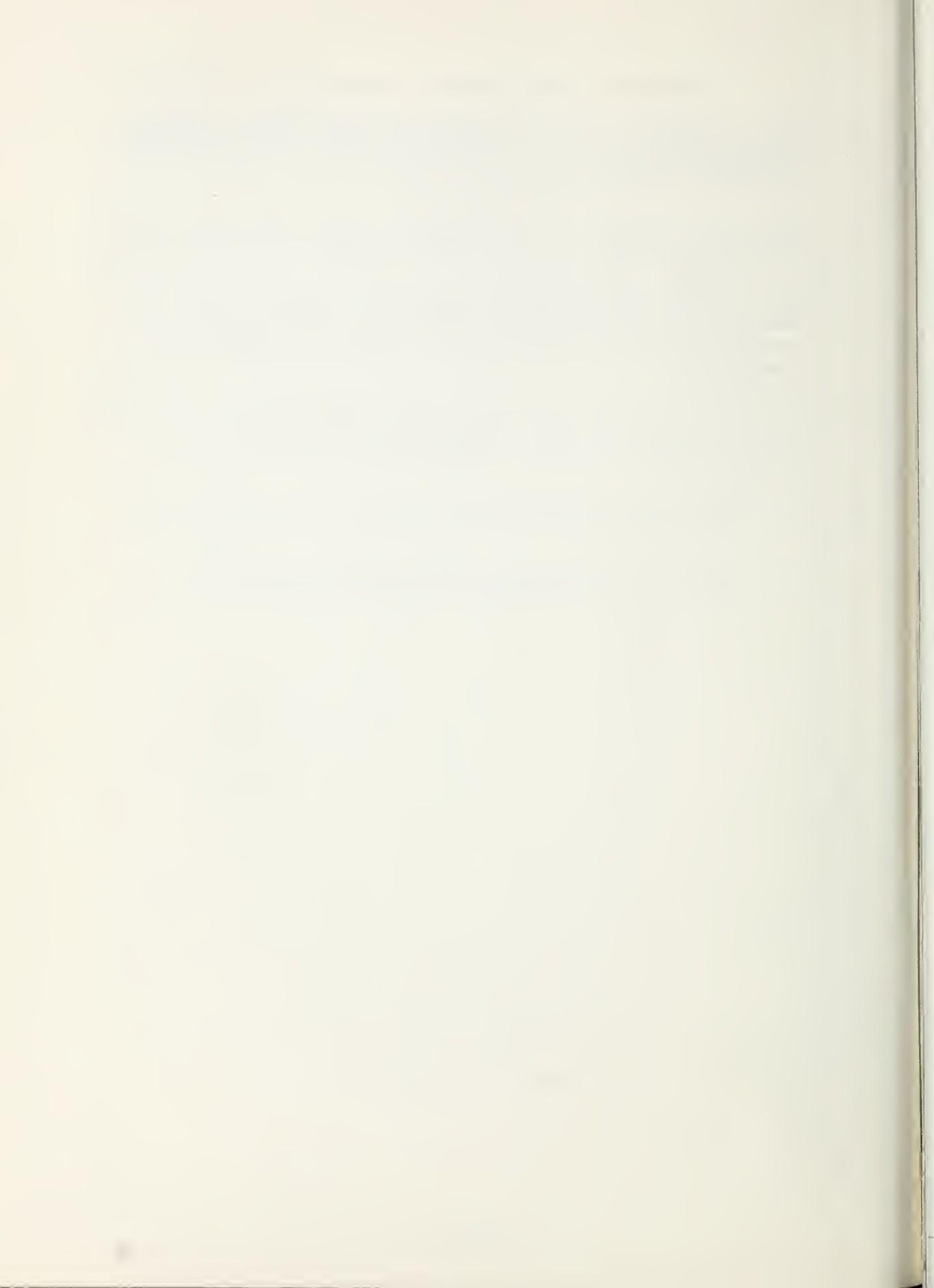
The no project approach would not eliminate flood damages. It would not provide added technical assistance for proper resource use nor for planned uses. As the watershed develops the lack of planning and technical assistance could result in critical erosion and sediment problems.

With no project, no relocations would be required nor would the clearing be needed for the structures. There would be no adverse effects from construction on the ecological systems or aesthetics of the watershed. Water quality of the stream would not be improved and would be subjected to degradation as additional urbanization takes place.

Foregoing such a project would cause a net annual monetary loss of over \$5,800 (see Appendix A).

#### SHORT-TERM VS. LONG-TERM USE OF RESOURCES

1. This watershed project fits into the overall town plan for future development. Also, the objectives are similar to those planned for the Connecticut River Basin.
2. The construction disturbance effect is expected to last for only two construction seasons. It is anticipated that all disturbed areas will be permanently stabilized within one year following construction.
3. Land treatment in the non-urban area will be subject to future changes. The land treatment measures applied on agricultural and forest lands are compatible when such land use undergoes urban development.
4. At the end of their economic life, the two structures will be almost as effective in conserving land and water resources as they will be the day they are installed. Land treatment measures will need re-application or appropriate alternatives as future uses dictate.
5. (a) The PL-566 watershed program activity is below the national average for Subregion B of the Northeast Atlantic Region.  
(b) The works of improvement of this project are comparable to other projects of the region in nature but not in scope.



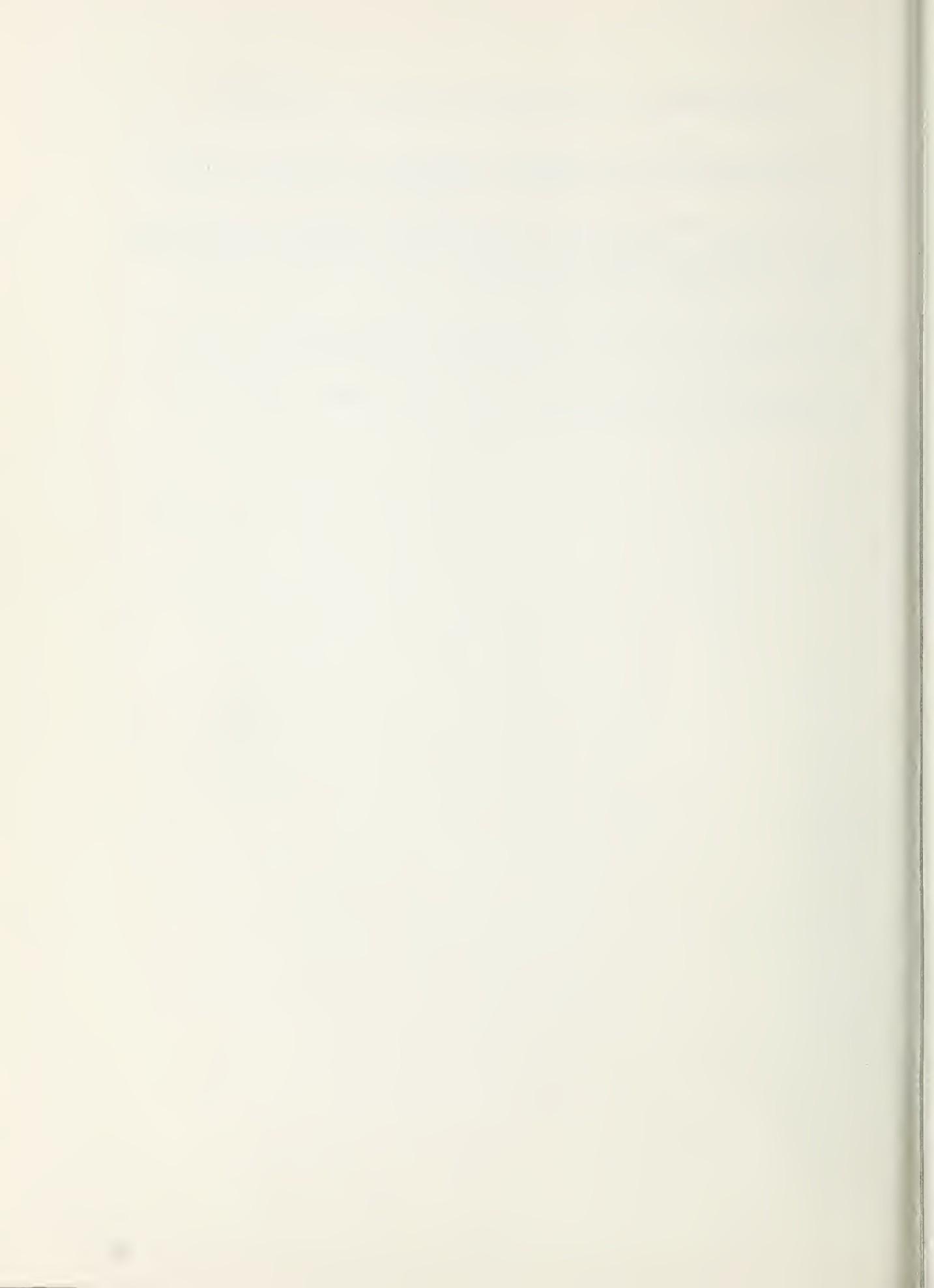
## IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The installation of this project will require 1.7 acres for the dam and spillway at Site 1 and 1.5 acres for the dam and spillway at Site 2.

The 59 acres required for the two floodwater retarding structures and flood pools will prevent their use for urban development. The present use of the 59 acres is 11.2 cropland, 4.9 pastureland, 11 wetland, 26.5 forest lands, and 5.4 urban land.

Agricultural and wildlife uses of the flood detention pool areas will be periodically interrupted by floodwaters on 49.6 acres of land.

The project will commit \$827,600 and five man-years of labor to the installation of the structures.



## CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

### General

Avery Brook Watershed project began in mid-1971. The town of South Windsor requested the State Department of Environmental Protection to help them in securing federal assistance with their flooding problem. The result of this action was a feasibility study by the Soil Conservation Service. After this the Town Council notified the State Clearinghouse of intent to file for federal assistance.

The town prepared an application which was approved for the Governor by the State Department of Environmental Protection and was forwarded to the Administrator of the Soil Conservation Service.

The town met with the Service personnel on numerous occasions to reach a common understanding of the watershed's problems, resources and potentials. The town officials then invited all concerned individuals in addition to local, state, and federal agencies to participate by making additional recommendations, each within its area of expertise. To assist with this, the groups were given a tour of the watershed. The planning authorization was requested and granted in July 1972.

A joint biological investigation was conducted by the Soil Conservation Service and the Connecticut Department of Environmental Protection. The U.S. Fish and Wildlife Service made their own field reconnaissance and reviewed and commented on the joint biological investigation.

The Connecticut River Basin Study Reports, the John J. Mozzochi Associates Avery Brook Drainage Report and data of the U.S. Army Corps of Engineers on the Hockanum River were used in the development of the Avery Brook Watershed Plan. These studies were useful in considering the total sub-region influences. Local, state, and federal agencies' data were compiled and the Town Council held a public hearing before deciding to proceed with the project. The Council then notified the Soil Conservation Service of the decision to have this project formulated.

The most recent National Register of Historical Places was reviewed, the State Historical Preservation Officer and Connecticut Archaeological Survey, Inc. were consulted to determine the effect, if any, the project would have on historical or archaeological places.

Discussion and Disposition of each comment of draft statement

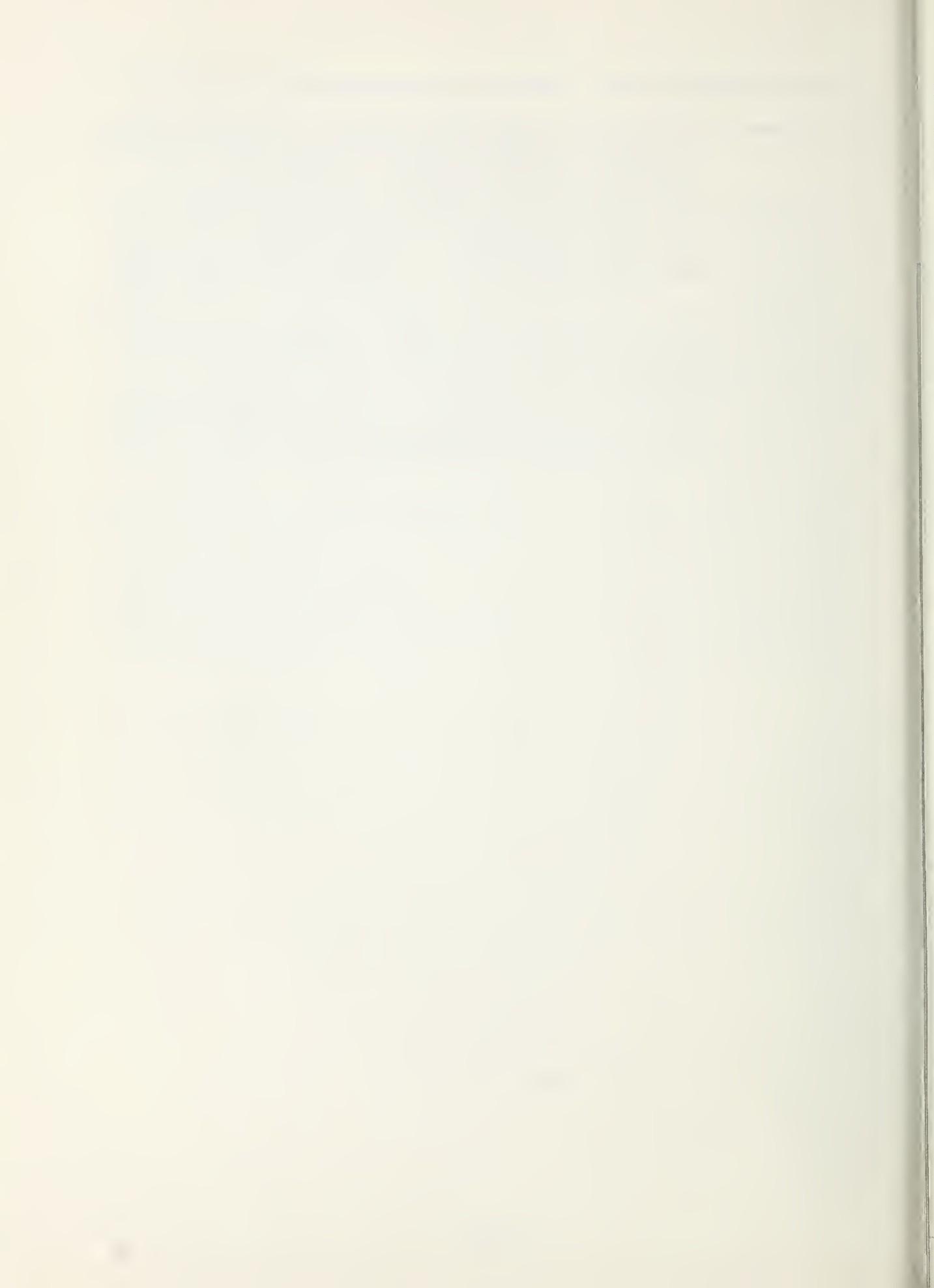
The following have received draft copies of the Plan and Environmental Impact Statement:

Department of Agriculture - Office of Equal Opportunity	- Responded
Department of the Army	- No response
Department of Commerce	- No response
Department of Health, Education and Welfare	- Responded
Department of the Interior	- Responded
Department of Transportation	- Responded
Environmental Protection Agency	- Responded
Federal Power Commission	- No response
Governor of Connecticut	- Responded through Dept. of Environmental Protection
State Clearinghouse	- No response
Regional Clearinghouse	- No response
State Department of Transportation	- No response
USDA, Agricultural Stabilization and Conservation Service - Connecticut	- No response
Hartford County Soil and Water Conservation District	- No response
Natural Resources Defense Council	- No response
Friends of the Earth	- No response
Environmental Defense Fund	- No response
National Wildlife Federation	- No response
National Audubon Society	- No response
Environmental Impact Assessment Project	- No response
Town of South Windsor	- No response

Department of Agriculture - Office of Equal Opportunity

1. Comment: In the Economic and Social Section, p. E-41, it is stated that no minorities or low income families will be adversely affected by the proposed plan. Throughout the rest of the report, no other reference is made to the possible social and economic impact of the plan on the minority population (9.7 percent in Hartford County). Because of this void, we are unable to adequately assess the socio-economic effects of the plan on the minority population.

Response: There are six minority families living within the watershed, none of which will be adversely affected by the project. There are 817,000 (1970 Census) minorities living in Hartford County, the equal opportunity employment policy clause in the Plan Agreement will provide the opportunity for employment of minorities during the construction of the two floodwater retarding structures.



U. S. Department of the Interior

1. Comment: Over the years, several attempts have been made to develop a feasible watershed plan acceptable to all concerned. A U.S. Fish and Wildlife reconnaissance report dated February 11, 1974, contained our evaluation and recommendations on a plan very similar to the one described in this work plan. The major difference is that the earlier plan proposed a 9.7-acre permanent pool at Site 1 and a dry bed or wet sediment pool at Site 2. The present plan calls for sediment pools at both sites. In our report, we recommended providing public access, among other items.

Response: The initial draft of the Avery Brook Plan presented to the people of the Town of South Windsor included a 9-acre permanent pool at Site 1. The legislative body of the town voted against the inclusion of the permanent pool at Site 1 and requested that it not be made a part of the final plan.

2. Comment: Page P-1 of the plan points out that the project will provide 59 acres of permanent open space in an urbanized area. Development has been increasing at a high rate, making open space, including fishing opportunities, even more valuable. These conditions are what prompted us to endorse the permanent pool conditions at Site 1, dry-bed at Site 2 and, most important, public access to both sites.

Response: The public will have access to open space areas created by the project. The plan and EIS, pages P-1, E-40 and E-43 have been revised accordingly.

3. Comment: Page E-25 - The list of bird species should include waterfowl.

Response: Waterfowl have been added to the list.

4. Comment: Page E-43 - We note that the significance of this impact would be greatly increased if public access was provided to the 59 acres.

Response: See response to Comment 2.

5. Comment: No. 10 - This statement should be clarified. Vegetation will be initially destroyed by the construction and be precluded at the immediate sites by the structures.

Response: No. 10, page E-43, has been revised.

6. Comment: Page E-47, Alternatives - This section should include a discussion of the alternative to which our reconnaissance report, dated February 11, 1974, was addressed. It should include the reasons why the alternative was dropped.

Response: See response to Comment 1.

7. Comment: Page E-91, Appendix F - We have noted that the State Historic Preservation Officer's letter names the sites of historic interest and goes on to imply they are subject to effect by the project and that protective steps should be taken, yet, on page E-30 it is stated that the two sites will not be affected. Does the State Historic Preservation Officer agree with this? Further, page E-30 indicated the National Register of Historic Places shows no sites in the project area and on page E-55 it states the most recent National Register of Historic Places was checked. The State Historic Preservation Officer in his letter of 1972 (4 years ago) did not mention the National Register of Historic Places, and we feel this environmental statement should indicate the dates of the recent updating as checked in the Federal Register. We feel the greatest assurance of no oversight of sites being considered for nomination to the National Register of Historic Places is to secure a commentary of that nature from the State Historic Preservation Officer.

Response: The two houses referred to in the letter from the State Historic Commission are outside the project area and will not be affected by the project.

National Register of Historical Places published in the Federal Register of February 10, 1976, Part II was checked also Federal Register, Vol. 41, No. 150 - Tuesday, August 3, 1976 and the most recent Federal Register, Vol. 41, No. 194 - Tuesday, October 5, 1976, none of which list properties in the project area.

Department of Transportation - U. S. Coast Guard

1. Comment: The proposed project seems inconsistent with some of Connecticut's land use policies, in particular with number four concerning the protection of floodplains. The alternative of acquiring all floodplain property would be more in accord with this policy and, therefore, may merit additional consideration.

Response: See page E-47.

2. Comment: It appears that the proposed standpipe will be impassible to suspended organic material and aquatic organisms. Another design, such as a culvert, might avoid this problem.

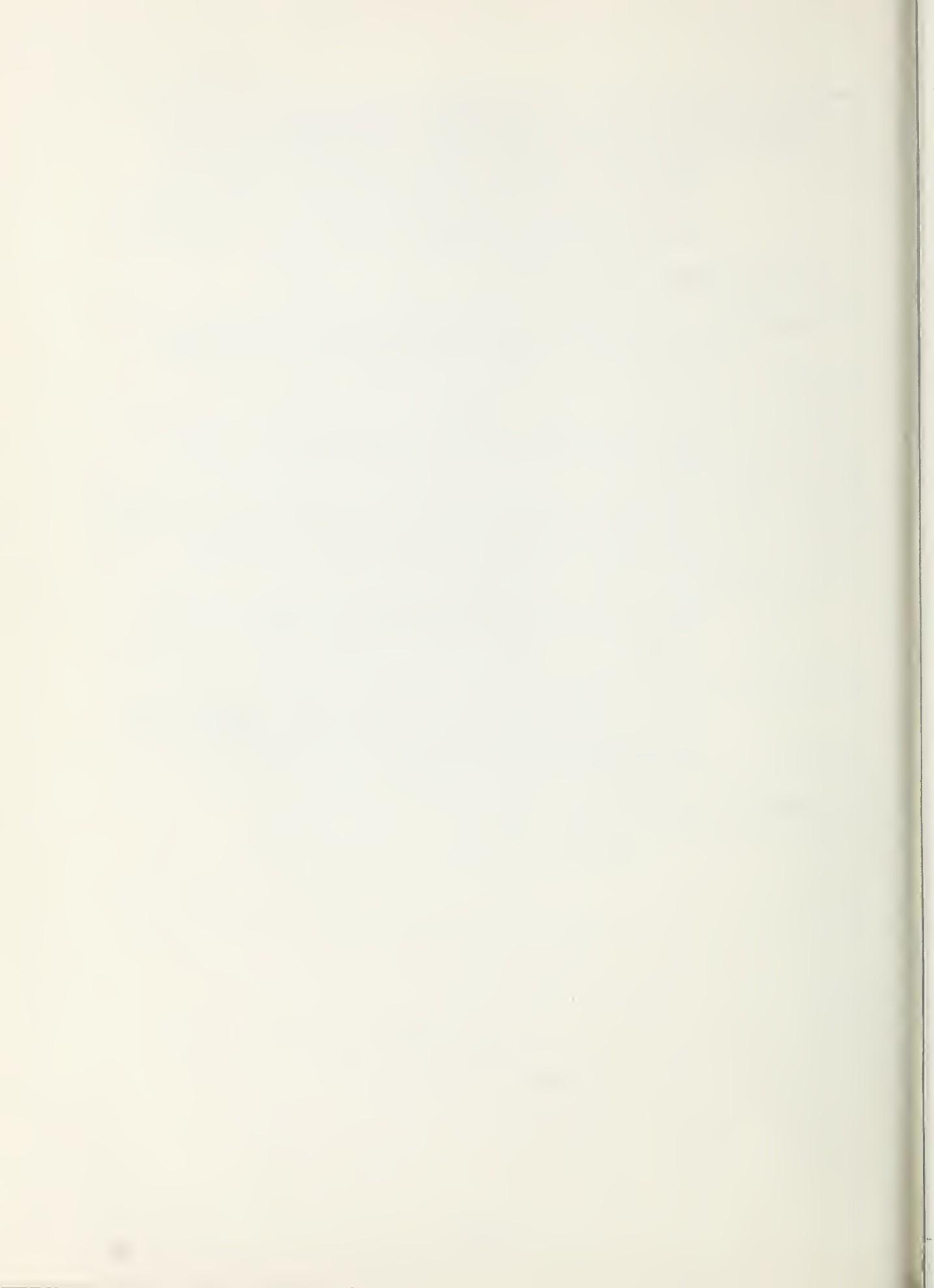
Response: The "standpipe" allows normal flow to pass through the earth embankment with no impounding of this water.

3. Comment: The reduction of 6% in surface runoff (p. E-43) may in the long run be offset by the 77% reduction in the floodplain if the reduced flood hazard encourages urbanization along Avery Brook and thereby increases surface runoff.

Response: The two floodwater retarding structures were planned based on the runoff from projected development within this watershed, therefore, any change in the 77 percent reduction in the floodplain will be minor.

4. Comment: Since a number of flood control projects are being considered for the Connecticut River Basin, a program EIS, as recommended by the CEQ, may more accurately define their long-term significance.

Response: Noted.

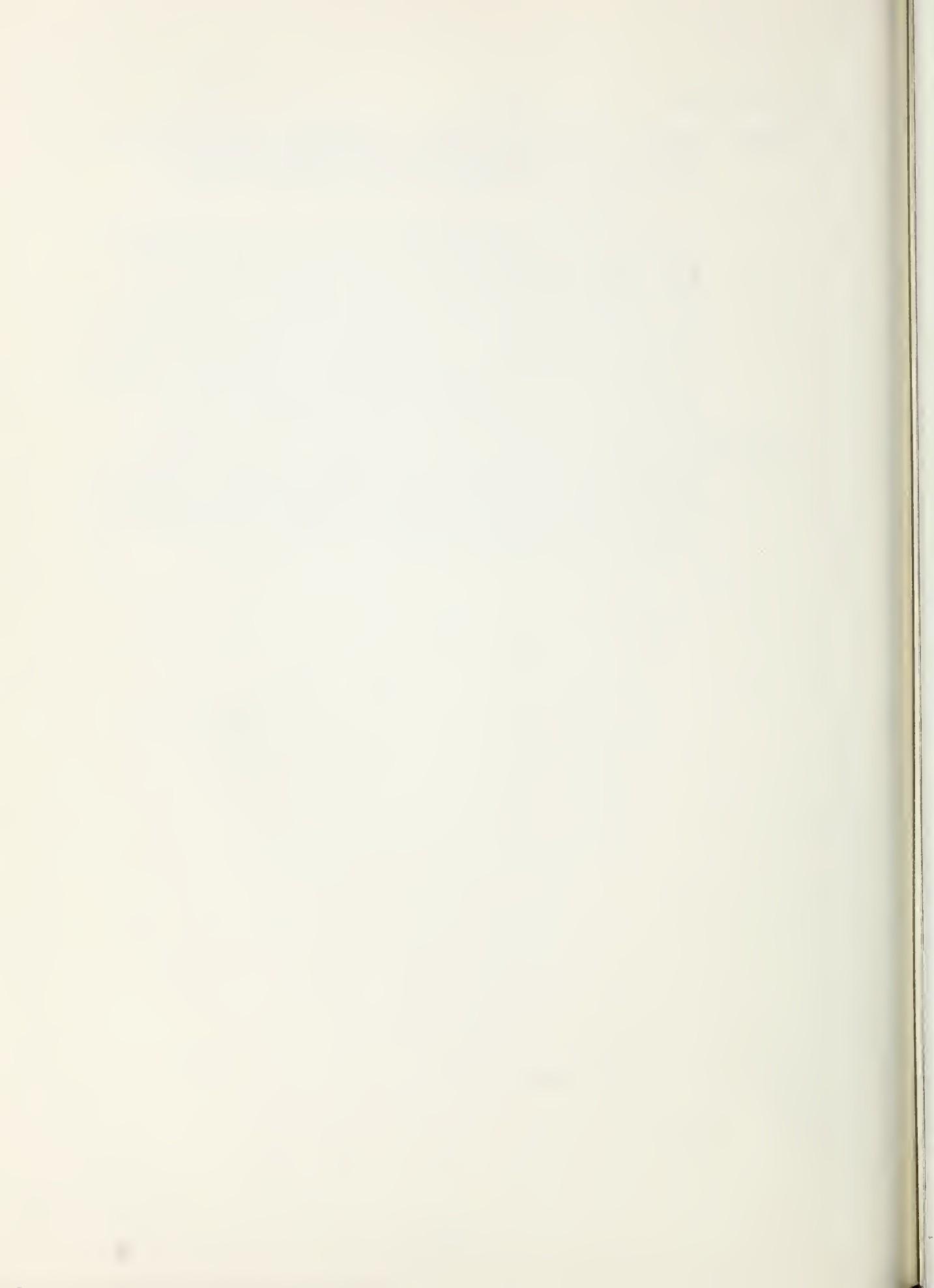


U. S. Environmental Protection Agency

1. Comment: We have reviewed the draft environmental impact statement (EIS) for Avery Brook Watershed Project and have no objections to the project and have found the draft EIS to be complete.

However, the text states that the water quality data was collected during November 1974 and July 1975 and that a HACH kit was used for the analysis. The HACH kit is a good estimate of conditions encountered in the field but should not be used for a definitive study. Water quality data to be presented in the final EIS should be done by a recognized lab. A sampling program should be established to reflect the seasonal fluctuations of hydrology, flora and fauna, since the stream has a fisheries resource.

Response: A telephone conversation on November 19, 1976 with Mr. Richard Pastore, Water Quality Branch, Region 1, established that due to the limited fisheries resource and the fact that the structures will not limit fish migration, further water quality analysis is unnecessary.



## LIST OF APPENDICES

Appendix A - Display Accounts for Selected Alternative

Appendix B - Summary Comparison of Alternatives

Appendix C - Letters of Comment  
Received on the Draft Environmental  
Impact Statement

Appendix D - Project Map

Appendix E - Plants and Animals Named in this Statement

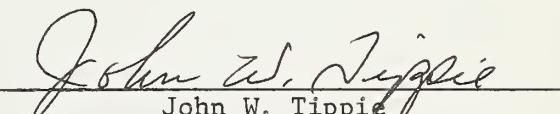
Appendix F - Letters Received from the Connecticut  
Archaeological Survey, Inc. and the  
Connecticut Historical Commission

Appendix G - Soil Capability Class Descriptions

Appendix H - Bibliography

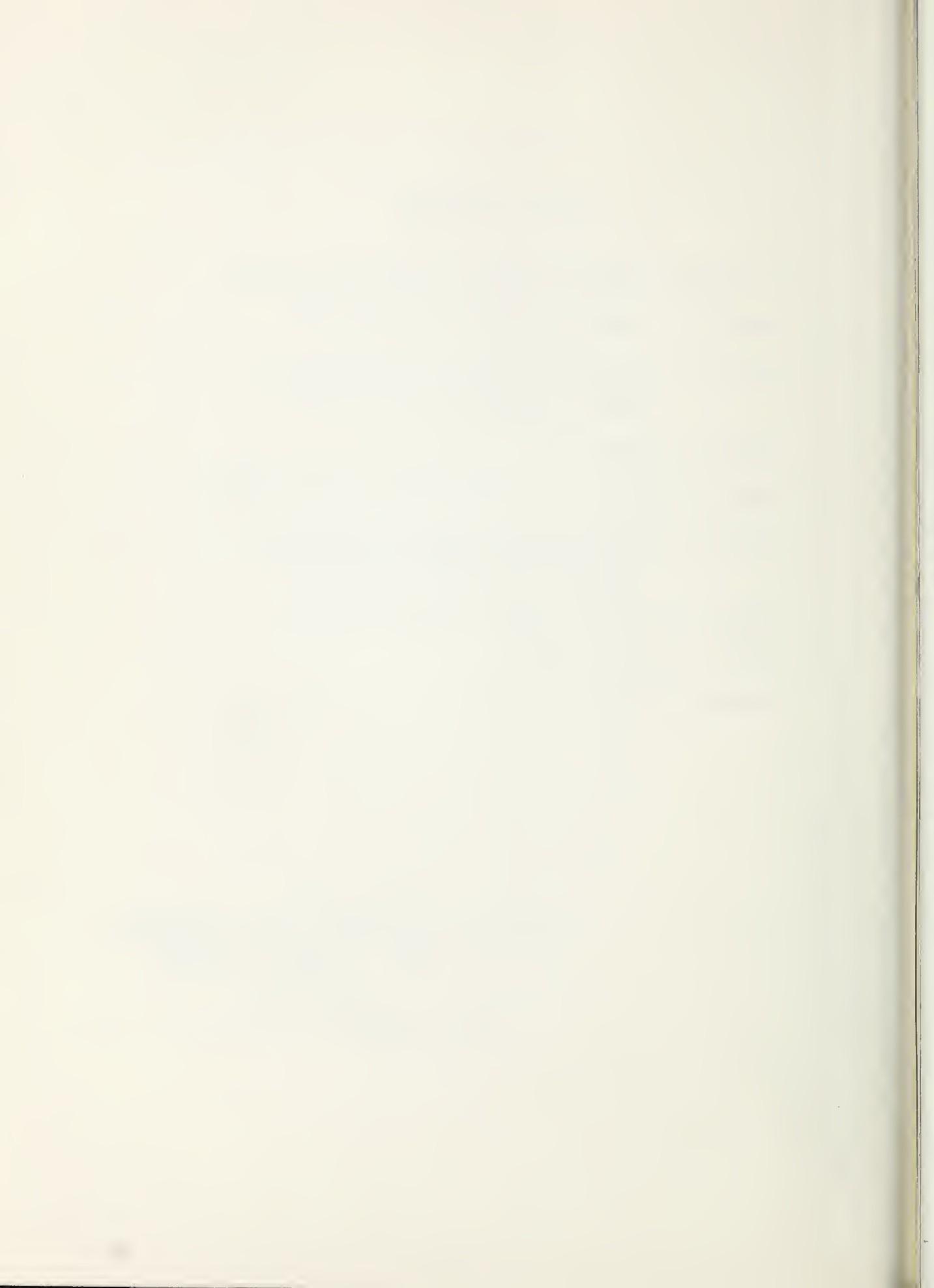
Appendix I - Flood Plain Map

Approved By

  
John W. Tippie  
State Conservationist

Date

2/23/77



APPENDIX A



TABLE B

PLAN A - SELECTED PLAN 1/

## AVERY BROOK WATERSHED

NATIONAL ECONOMIC DEVELOPMENT ACCOUNT 2/

COMPONENTS	MEASURES OF EFFECTS	COMPONENTS	MEASURES OF EFFECTS
<b>Beneficial effects:</b>		<b>Adverse effects:</b>	(Average Annual) <u>3/</u>
A. The value to users of increased outputs of goods and services		A.	The value of resources required for a plan.
1. Floodwater damage		1.	Flood prevention structures
a. Residential	\$44,600	a.	Project installation \$40,800
b. Roads & bridges	1,550	b.	Project O & M 1,300
c. Indirect	4,750	c.	Project administration 3,000
B.		B.	Losses in output resulting from external diseconomies. -
The value of output resulting from external economies.	-		
<b>TOTAL BENEFICIAL EFFECTS</b>	<b>50,900</b>	<b>TOTAL ADVERSE EFFECTS</b>	<b>45,100</b>
		<b>NET BENEFICIAL EFFECTS</b>	<b>5,800</b>
		<u>1/</u>	Land treatment beneficial effects were not evaluated. Land treatment cost for the selected plan will be \$114,900.
		<u>2/</u>	Price base 1976
		<u>3/</u>	100 years @ 6 1/8 percent interest



TABLE C

PLAN A - SELECTED PLAN  
 AVERY BROOK WATERSHED

## ENVIRONMENTAL QUALITY ACCOUNT

## COMPONENTS

## MEASURES OF EFFECTS

## Beneficial and Adverse Effects:

## A. Areas of natural beauty.

1. The dams, pool area, spillway, and inseparable adjacent lands will provide 59 acres of permanent public space in an urbanizing area.
  2. The project will restrict the use of about 59 acres of land from private ownership.
- 
1. Land treatment will be provided on 150 acres of cropland, 15 acres of pastureland, 150 acres of forest land, 395 acres of urban build-up land, and 40 acres of other land (15 acres wildlife habitat and 25 acres of outdoor recreation lands).
  2. The two sites will trap 20.5 acre-feet of sediment during the first 50 years; thus they will allow only 25 acre-feet to pass through the structures.
  3. Land treatment will reduce floodwater runoff by 6 percent and sediment by 26 percent.
  4. Sites 1 and 2 will reduce floodwater damages by 86 percent.
  5. The flood plain area will be reduced by 77 percent, benefiting 67 homes and town roads and bridges.

## TABLE C

## PLAN A - SELECTED PLAN

## AVERY BROOK WATERSHED

## ENVIRONMENTAL QUALITY ACCOUNT

## COMPONENTS

## MEASURES OF EFFECTS

6. 315 feet of stream channel will be under the dams.
7. 5,900 feet of stream channel will be intermittently inundated.
8. Water, noise, and air pollution will be increased during construction.
9. Flood stage reductions will average about 2 feet throughout the damage area.
10. The land use of each site will be changed by the installation of the project from; 11.2 acres of cropland, 4.9 acres of pastureland, 11.0 acres of wetland and stream surface, 26.5 acres of forest land, and 5.4 acres of urban build-up to 59 acres of dams and pool area.
- C. Biological resources and selected ecosystems.
1. The ecosystems of the 49.6 acres inundated by the two floodwater structures intermittently will be disturbed during and shortly after flooding and may undergo change from upland habitat to wetland habitat.
  2. The land treatment will provide habitat for fish and wildlife of the watershed.
- D. Irreversible or irretrievable commitments.
1. Installation of the two structures will commit labor and capital to the project.
  2. The installation of this project will require 3.2 acres for the two dams and spillway, 49.6 acres for the flood pools that will receive intermittent flooding, and 7 acres for access ways.
  3. The 59 acres required for floodwater retarding structures will prevent their use for urban development. The present land use is 11.2 acres cropland, 4.9 acres pastureland, 11.0 acres wetland and stream surface, 26.5 acres of forest land and 5.4 acres of urban build-up.

TABLE D

## PLAN A - SELECTED PLAN

## AVERY BROOK WATERSHED

## REGIONAL DEVELOPMENT ACCOUNT

COMPONENTS	<u>STATE OF CONNECTICUT</u> (Average Annual)	MEASURES OF EFFECTS	
		<u>REST OF NATION</u>	
<u>Income</u>			
Beneficial effects:			
A. The value of increased output of goods and services to users residing in the region.		-	-
1. Floodwater damage	\$44,600	-	-
a. Residential	1,550	-	-
b. Roads & bridges	4,750	-	-
c. Indirect			
B. The value of output to users residing in the region from external economies.			
1. Indirect from floodwater damages benefits	5,100	-	-
TOTAL BENEFICIAL EFFECTS	56,000	-	-
<u>Adverse effects:</u>			
A. The value of resources contributed from within the region to achieve the outputs.			
1. Flood prevention structures			
a. Project installation	24,300	\$16,500	-
b. Project O & M	1,300	-	3,000
c. Project administration			

TABLE D

PLAN A - SELECTED PLAN  
 AVERY BROOK WATERSHED

## REGIONAL DEVELOPMENT ACCOUNT

COMPONENTS	<u>STATE OF CONNECTICUT</u>	MEASURES OF EFFECTS	
		(Average Annual) <u>1/</u>	<u>REST OF NATION</u>
B. Losses of output resulting from external diseconomies to users residing in the region.	-	-	-
C. Loss of assistance payments from sources outside the region to otherwise unemployed or under-employed resources.	-	-	-
TOTAL ADVERSE EFFECTS	\$25,600	\$19,500	
NET BENEFICIAL EFFECTS	30,400	-19,500	
<u>Employment</u>			
Beneficial effects:			
A. Increase in the number and types of jobs.			
1. Project construction	3.1 man years of skilled employment	-	
2. Project operation and maintenance	1.8 man years of unskilled employment	-	
	0.1 man years of unskilled employment	-	

1/ 100 years @ 6 1/8 percent interest.

TABLE D

## PLAN A - SELECTED PLAN

## AVERY BROOK WATERSHED

## REGIONAL DEVELOPMENT ACCOUNT

COMPONENTS	MEASURES OF EFFECTS	
	STATE OF CONNECTICUT	REST OF NATION
TOTAL BENEFICIAL EFFECTS		
4.9 man years during project installation period.	-	-
0.1 man years of permanent full-time during project evaluation period.	-	-
Adverse effects:		
A. Decrease in number and types of jobs.	-	-
TOTAL ADVERSE EFFECTS	-	-
NET BENEFICIAL EFFECTS	4.9 man years during project installation period.	-
Population distribution	0.1 man years of permanent full-time during project evaluation period.	-
Beneficial and adverse effects:	-	-
Regional economical base and stability	Project will create 4.9 man years of employment	-
Beneficial and adverse effects:	during project installation period and 0.1 man years full-time employment during project evaluation period. It will reduce average annual flood damages by \$50,900.	-
Environmental conditions of special regional concern	-	-
Beneficial and adverse effects:	-	-

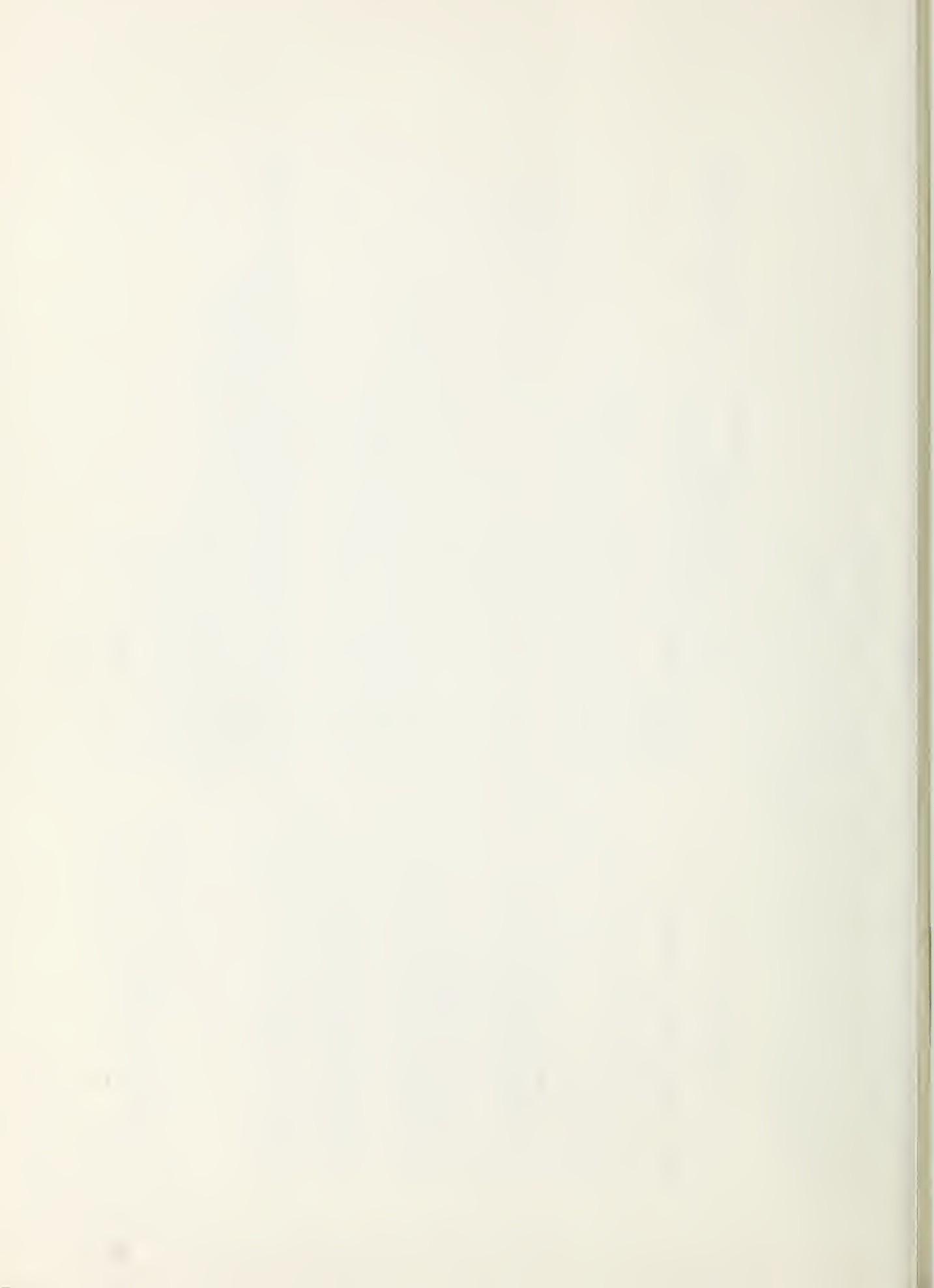


TABLE E

## PLAN A - SELECTED PLAN

## AVERY BROOK WATERSHED

## SOCIAL WELL-BEING ACCOUNT

ComponentsMeasures of Effects

## Beneficial and Adverse Effects:

A. Real Income Distribution: 1. Create 0.1 man years of low income permanent employment.

2. Create regional income benefits of \$56,000 distributed by income class as follows:

Income Class (Dollars)	Percentage of Adjusted Gross Income in Class	Percentage Benefits in Class
Less than 3,000	05.4	05.0
3,000 to 10,000	31.5	29.8
More than 10,000	63.1	65.2

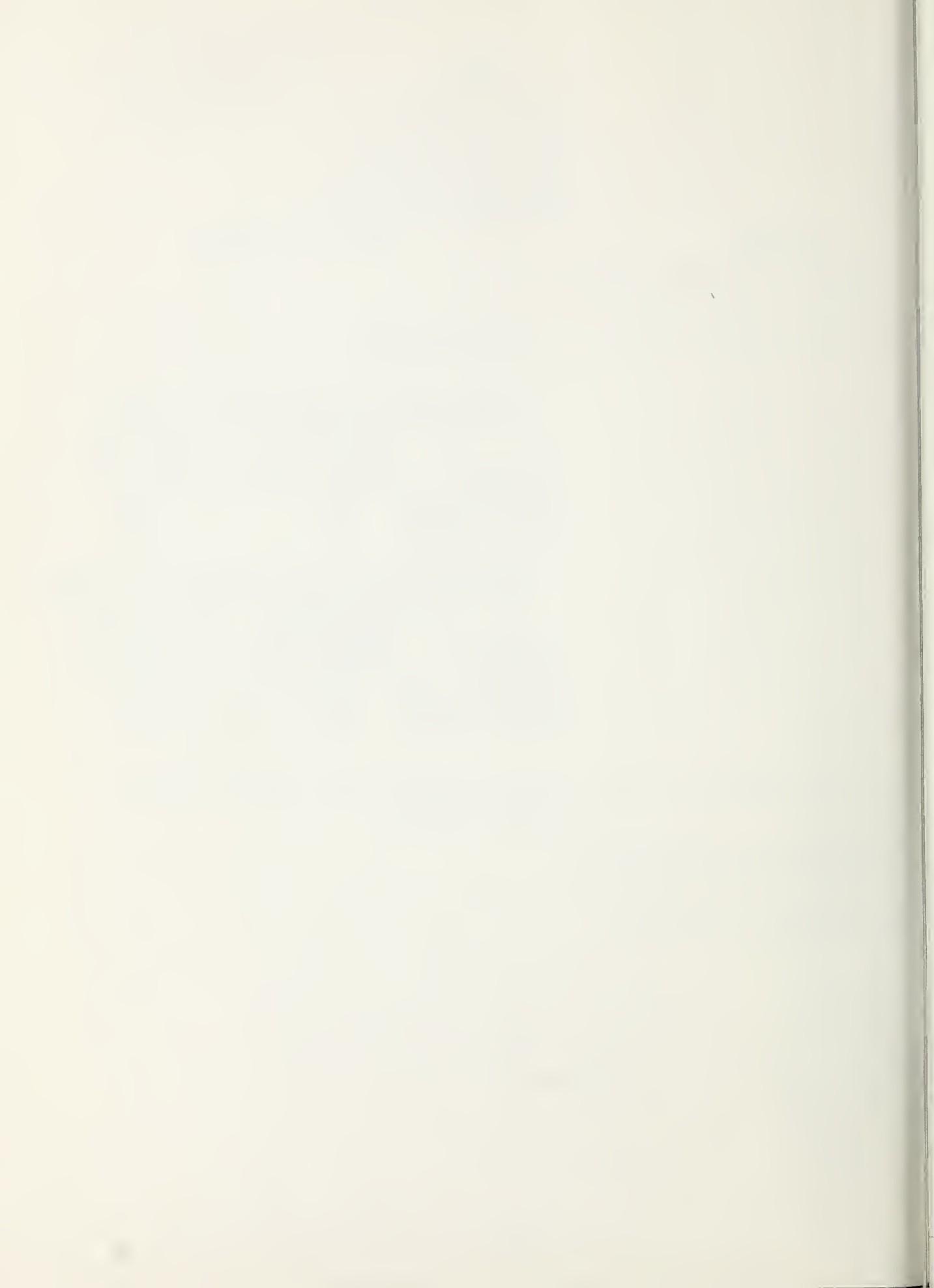
3. Local Cost to be borne by region total \$25,800 with distribution by income class as follows:

Income Class (Dollars)	Percentage of Adjusted Gross Income in Class	Percentage Contributions in Class
Less than 3,000	05.4	05.4
3,000 to 10,000	31.5	31.5
More than 10,000	63.1	63.1

B. Life, Health and Safety: Provide protection from a storm of 100-year frequency magnitude.

C. Educational Cultural, and Recreational Opportunities: --

D. Emergency Preparedness: --



APPENDIX B



TABLE A

SUMMARY COMPARISON BETWEEN PLAN B, PLAN C, AND SELECTED PLAN  
AVERY BROOK WATERSHED

ACCOUNT	SELECTED PLAN	PLAN B	PLAN C
<u>National Economic Development</u>			
Beneficial effects	\$50,900	\$54,700	\$59,710
Adverse effects	45,100	47,200	70,300
Net beneficial effects	5,800	7,500	-10,590
<u>Environmental Quality</u>	-	-	-
A. Areas of natural beauty		The structure at Site 1 will create a 9.7-acre sediment pool with about .7 miles of shore line.	
B. Quality considerations of water, land, and air resources		The two sites will trap 20.5 acre-feet of sediment during the first 50 years; thus they will allow only 25 acre-feet to pass through the structures.	The two sites will trap 40.1 acre-feet of sediment during the first 50 years; thus they will allow only 11.1 acre-feet to pass through the structures.
			The two sites will trap 20.5 acre-feet of sediment during the first 50 years; thus they will allow only 25 acre-feet to pass through the structures.
			Site 1 and 2 will reduce floodwater damages by an additional 84 percent.
			Site 1 and 2 will reduce floodwater damages by an additional 93 percent.
			315 feet of stream channel will be under dams and sediment pool.
			2,100 feet of stream channel will be under the dams.
			315 feet of stream channel will be under the dams.

TABLE A

## SUMMARY COMPARISON BETWEEN PLAN B, PLAN C, AND SELECTED PLAN

## AVERY BROOK WATERSHED

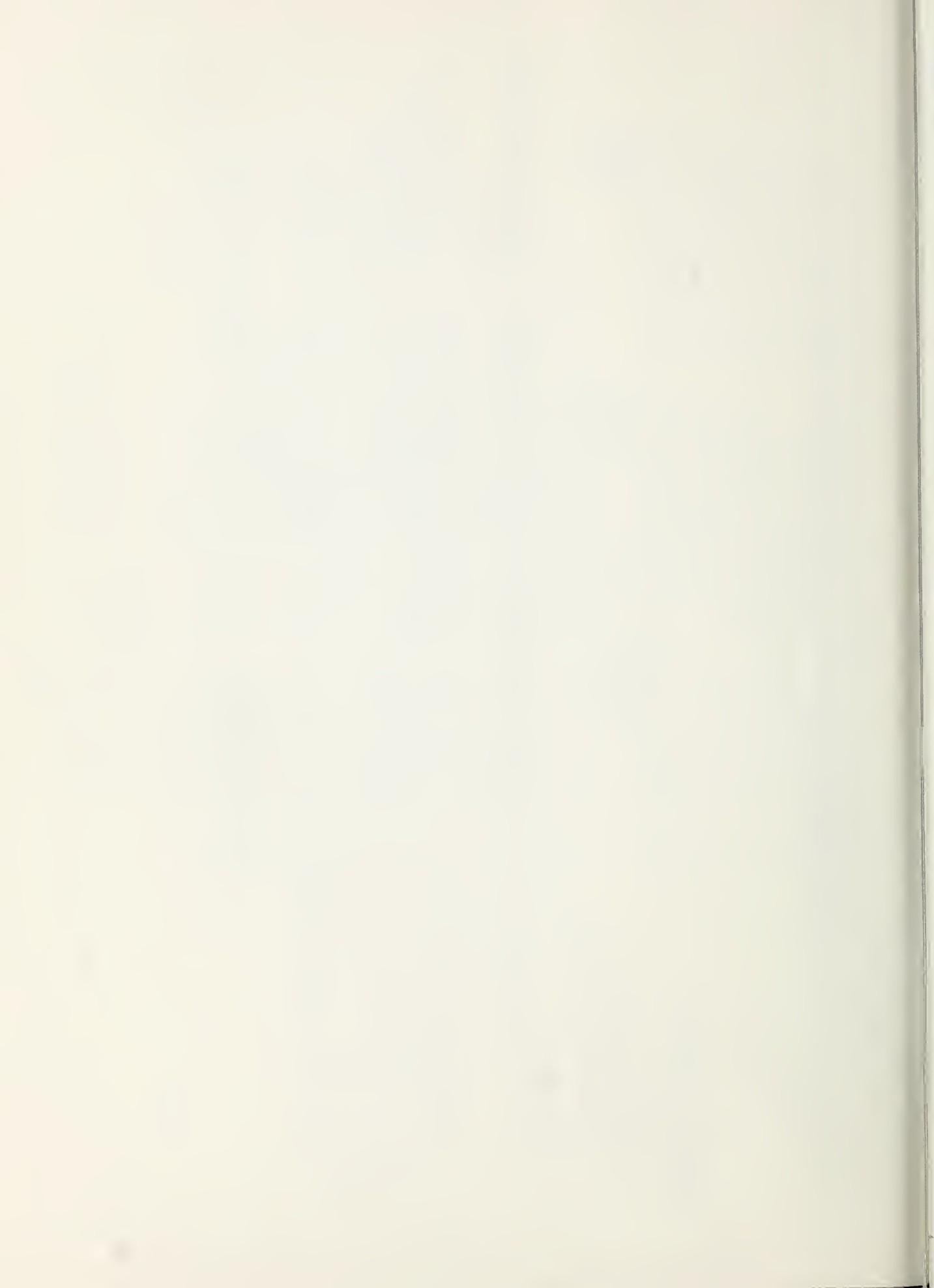
ACCOUNT	SELECTED PLAN	PLAN B	PLAN C
	5,900 feet of stream channel will be intermittently inundated.	5,600 feet of stream channel will be intermittently inundated.	5,900 feet of stream channel will be intermittently inundated.
	Flood stage reduction will average about 2 feet throughout the damage area.	Flood stage reduction will average about 2 feet throughout the damage area.	Flood stage reduction will average about 2.5 feet throughout the damage area.
C. Biological Resources and Selected Ecosystems.	-	A 9.7-acre sediment pool, with fishery and recreation use will be created.	-
		The ecosystem of the 9.7-acre wet sediment pool will change 8.4 acres from Type 2 and 3 wetland to Type 5 wetland.	The ecosystem of the 9.7-acre wet sediment pool will change 8.4 acres from Type 2 and 3 wetland to Type 5 wetland.
		The ecosystem of 49.6 acres inundated by the two floodwater structures intermittently will be disturbed during and shortly after flooding and may undergo change from upland habitat to wetland habitat.	The ecosystem of 37 acres inundated by the two floodwater structures intermittently will be disturbed during and shortly after flooding and may undergo change from upland habitat to wetland habitat.

TABLE A

## SUMMARY COMPARISON BETWEEN PLAN B, PLAN C, AND SELECTED PLAN

## AVERY BROOK WATERSHED

ACCOUNT	SELECTED PLAN	PLAN B	PLAN C
<u>Regional Development</u>			
A. State of Connecticut			
A. Income	\$56,000	\$59,630	\$65,200
Beneficial effects	25,600	26,240	29,740
Adverse effects	30,400	33,390	35,460
B. Employment			
Project construction	4.9 man years during project installation period.	5.4 man years during project installation period.	10 man years during project installation period.
C. Social Well-Being			
Recreational Opportunities	-	-	0.4 man years of permanent full-time during project evaluation period.
C. Recreational Opportunities	-	-	Creates 500 visitor days of incidental recreation benefiting mostly children.



APPENDIX C



*Thru  
to Plain*



# United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

PEP ER-76/878

NOV 4 1976

Dear Mr. Halstead:

Thank you for the letter of August 31, 1976, requesting our views and comments on the draft environmental statement and watershed plan for Avery Brook Watershed, Hartford County, Connecticut. Our review indicates that the proposal has adequately considered those areas within our jurisdiction and expertise, except for several comments and suggestions offered below.

## Draft Watershed Work Plan

Over the years, several attempts have been made to develop a feasible watershed plan acceptable to all concerned. A U.S. Fish and Wildlife reconnaissance report dated February 11, 1974, contained our evaluation and recommendations on a plan very similar to the one described in this work plan. The major difference is that the earlier plan proposed a 9.7-acre permanent pool at Site 1 and a dry bed or wet sediment pool at Site 2. The present plan calls for sediment pools at both sites. In our report, we recommended providing public access, among other items.

Page P-1 of the plan points out that the project will provide 59 acres of permanent open space in an urbanized area. Development has been increasing at a high rate, making open space, including fishing opportunities, even more valuable. These conditions are what prompted us to endorse the permanent pool at Site 1, dry-bed at Site 2 and, most important, public access to both sites.

Basically, regarding fish and wildlife impacts of the present plan, we can foresee no significant detrimental effects. We do feel, however, that the earlier plan was more beneficial to the people living in the area. The permanent pool at Site 1, if created deep enough to sustain low water temperatures, would have presented opportunities to enhance the trout fishery. Currently, the principal fishing area appears to be a small 3.5-acre pond which has no public access. Thus, the fishery



resources will remain limited under the present plan.

We continue to recommend that public access be provided to the two flood restoration sites--perhaps by way of the maintenance roads--so that the open space can be enjoyed by everyone.

Draft Environmental Statement

Page E-25 - The list of bird species should include waterfowl.

Page E-43 - We note that the significance of this impact would be greatly increased if public access was provided to the 59 acres.

No. 10 - This statement should be clarified. Vegetation will be initially destroyed by the construction and be precluded at the immediate sites by the structures.

Page E-47, Alternatives - This section should include a discussion of the alternative to which our reconnaissance report, dated February 11, 1974, was addressed. It should include the reasons why the alternative was dropped.

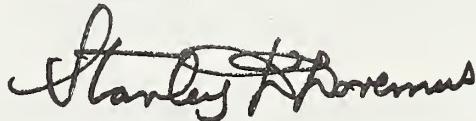
Page E-91, Appendix F - We have noted that the State Historic Preservation Officer's letter names the sites of historic interest and goes on to imply they are subject to effect by the project and that protective steps should be taken, yet, on page E-30 it is stated that the two sites will not be affected. Does the State Historic Preservation Officer agree with this? Further, page E-30 indicates the National Register of Historic Places shows no sites in the project area and on page E-55 it states the most recent National Register of Historic Places was checked. The State Historic Preservation Officer in his letter of 1972 (4 years ago) did not mention the National Register of Historic Places, and we feel this environmental statement should indicate the dates of the National Register of Historic Places checked and its most recent updating as checked in the Federal Register. We feel the greatest assurance of no oversight of sites being considered for nomination to the National Register of Historic Places is to secure a commentary of that nature from the State Historic Preservation Officer.

The Soil Conservation Service should be reminded that it can secure a determination of eligibility for listings of sites on the National Register of Historic Places, such as the two identified, by making such a request directly to the Director, Office of Archeology and Historic Preservation, National Park Service, Interior Building, Washington, D. C. 20240.

We recommend that the Soil Conservation Service secure an updated, complete statement from the State Historic Preservation Officer, display and discuss it in the final environmental statement, and also cite the most up-to-date National Register of Historic Places checked.

We hope these comments and suggestions will be of assistance to you.

Sincerely yours,



Stanley R. Horner  
Deputy Assistant Secretary of the Interior

Mr. Robert G. Halstead  
State Conservationist  
U.S. Department of Agriculture  
Soil Conservation Service  
Mansfield Professional Park  
Storrs, Connecticut 06268

UNITED STATES DEPARTMENT OF AGRICULTURE  
OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20250

OFFICE OF EQUAL OPPORTUNITY

SEP 16 1976

IN REPLY  
REFER TO: 8140 Supplement 8

SUBJECT: Draft Watershed Plan and Environmental Impact Statement for  
the Avery Brook Watershed, Hartford County, Connecticut

TO: Robert G. Halstead  
State Conservationist

THRU: Verne M. Bathurst, Deputy  
Administrator for Management, SCS

This office reviewed the Watershed Plan and Environmental Impact Statement (EIS) for the Avery Brook Watershed for the purpose of assessing the socio-economic impact on the minority population.

In the Economic and Social Section, p. E-41, it is stated that no minorities or low income families will be adversely affected by the proposed plan. Throughout the rest of the report, no other reference is made to the possible social and economic impact of the plan on the minority population (9.7 percent in Hartford County). Because of this void, we are unable to adequately assess the socio-economic effects of the plan on the minority population.

In accordance with Soil Conservation Service guidelines for preparing environmental impact statements (Federal Register, Vol. 39, No. 107, June 3, 1974), we recommend that in the final EIS you include a more detailed assessment of the social and economic impact of the plan on the minority population.

  
JAMES FRAZIER  
Director

STATE OF CONNECTICUT  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING

HARTFORD, CONNECTICUT 06115

30 November 1976

Mr. Robert G. Halstead  
State Conservationist  
Soil Conservation Service  
Mansfield Professional Park  
Route 44A  
Storrs, Connecticut 06268

*Bob*  
Dear Mr. Halstead:

Thank you for providing me with the opportunity to comment on the Avery Brook Watershed Plan and Environmental Impact Statement.

The proposed project, as described, will provide substantial flood protection to an area along Avery Brook in South Windsor that has had serious flooding problems for sometime.

In addition to the flood protection provided by the Avery Brook Plan, 59 acres of permanent open space will be retained as part of the dry dam structures.

The Connecticut Department of Environmental Protection, as well as the Town of South Windsor, have been involved with the development of the watershed project since its inception, and I anticipate that continued cooperation between state, town and federal Soil Conservation Service will lead to successful completion of the project.

Sincerely yours,

*J.N.G.*  
Joseph N. Gill  
Commissioner

JNG:BAW:1jk

Flood Control  
Water Resources Unit  
Telephone no. 566-7245



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

OFFICE OF THE SECRETARY

WASHINGTON, D.C. 20201

NOV 1 1976

Mr. Robert G. Halstead  
State Conservationist  
Soil Conservation Service, USDA  
Mansfield Park  
Storrs, Connecticut 06268

Dear Mr. Halstead:

This Department has reviewed the draft environmental impact statement concerning Avery Brook Watershed, Hartford County, Connecticut. We feel that the concerns of this Department have been adequately addressed.

Thank you for the opportunity to review the document.

Sincerely,

A handwritten signature in black ink that reads "Charles Custard".

Charles Custard  
Director  
Office of Environmental Affairs



DEPARTMENT OF TRANSPORTATION  
UNITED STATES COAST GUARD

MAILING ADDRESS:

Commander (mep)  
Third Coast Guard Dist.  
Governors Island  
New York, NY 10004  
(212) 264-4904

5922/19b.1  
25/76  
27 October 1976

Mr. Robert G. Halstead  
Soil Conservation Service  
Mansfield Professional Park  
Storrs, Connecticut 06268

Dear Mr. Halstead:

We have reviewed the draft environmental impact statement for Avery Brook Watershed, Hartford County, Connecticut and have no comments concerning matters of specific Coast Guard jurisdiction. However, the following comments may be helpful in preparing the final watershed plan and impact statement.

**RELATIONSHIP TO LAND USE PLANS, POLICIES AND CONTROLS**

The proposed project seems inconsistent with some of Connecticut's land use policies, in particular with number four concerning the protection of floodplains. The alternative of acquiring all floodplain property would be more in accord with this policy and, therefore, may merit additional consideration.

**ENVIRONMENTAL IMPACTS**

It appears that the proposed standpipe will be impassible to suspended organic material and aquatic organisms. Another design, such as a culvert, might avoid this problem.

The reduction of 6% in surface runoff (p.E-43) may in the long run be offset by the 77% reduction in the floodplain if the reduced flood hazard encourages urbanization along Avery Brook and thereby increases surface runoff.

**SHORT-TERM VS. LONG-TERM USE OF RESOURCES**

Since a number of flood control projects are being considered for the Connecticut River Basin, a program EIS, as recommended by the CEQ, may more accurately define their long-term significance.

5922/19b.1  
25/76  
27 October 1976

We appreciate the opportunity to comment on this impact statement.

Sincerely,

*R. F. Wildermann*

R. F. WILDERMANN

Environmental Protection Specialist  
Marine Environmental Protection Branch  
By direction of the District Command

Copies to: (1) CEQ (5 copies)  
(2) G-WEP-7/73  
(3) TES-70



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

Mr. Robert G. Halstead  
State Conservationist  
Soil Conservation Service  
Mansfield Professional Park  
Storrs, CT 06268

Dear Mr. Halstead:

We have reviewed the draft environmental impact statement (EIS) for Avery Brook Watershed Project and have no objections to the project and have found the draft EIS to be complete.

However, the text states that the water quality data was collected during November 1974 and July 1975 and that a HACH kit was used for the analysis. The HACH kit is a good estimate of conditions encountered in the field but should not be used for a definitive study. Water quality data to be presented in the final EIS should be done by a recognized lab. A sampling program should be established to reflect the seasonal fluctuations of hydrology, flora and fauna, since the stream has a fisheries resource.

We don't feel that this prevents us from fully assessing the environmental impact of the project, but we do feel that more technically reliable data should be used and made available in the final EIS.

We have rated this draft EIS LO-1, in accordance with our national rating system, a copy of which is enclosed.

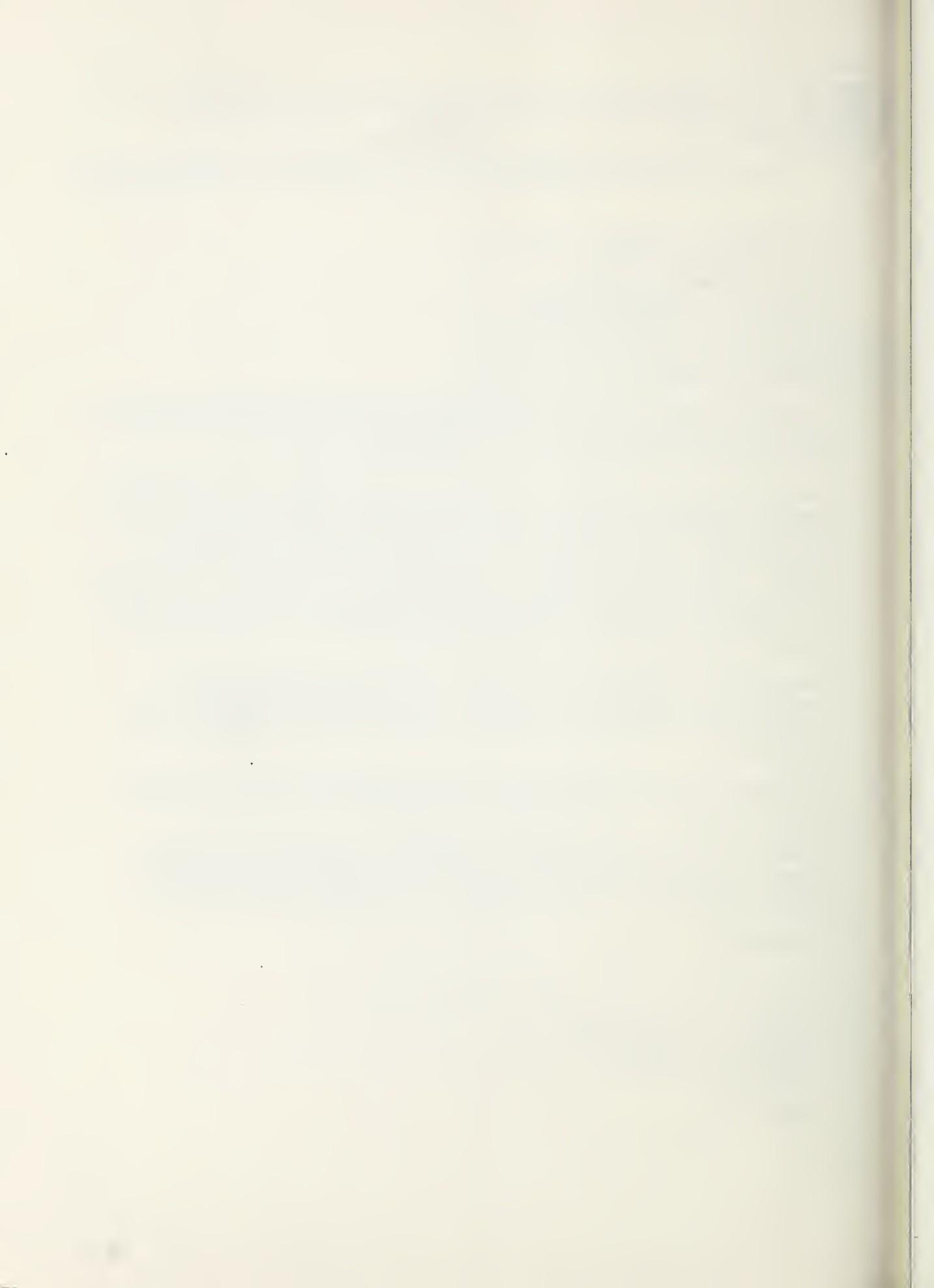
Thank you for the opportunity to comment on this draft EIS and we look forward to receiving the final. If you have any questions, please feel free to call John Lynch of my staff at 617-223-0400.

Sincerely,

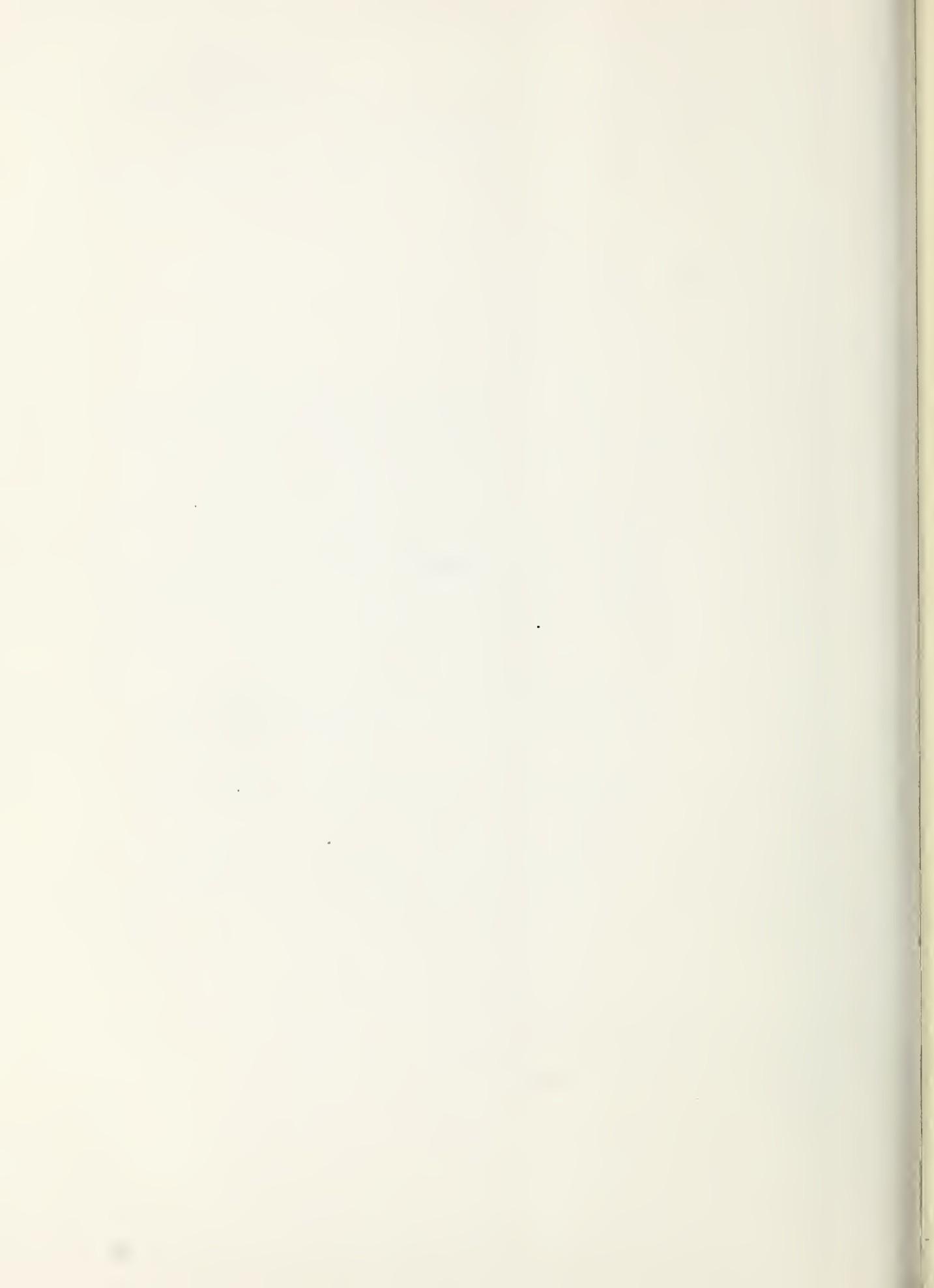
Wallace E. Stickney

Wallace E. Stickney, P.E.  
Director, Environmental Policy  
Coordination Office

Enclosure



APPENDIX D



CONNECTICUT

72°3'00"

41°50'00"

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

## PROJECT MAP AVERY BROOK WATERSHED HARTFORD COUNTY, CONNECTICUT





APPENDIX E



## PLANTS AND ANIMALS NAMED IN THIS STATEMENT

The following list gives the vernacular name and a scientific name of species of plants and animals that appear in the environmental impact statement. In some instances, family, order or genera names are provided when a more generalized name applies.

COMMON NAME	SCIENTIFIC NAME
<b>Wildlife</b>	
Cottontail rabbit	<i>Sylvilagus floridanus</i>
Ringneck pheasant	<i>Phasianus colchicus</i>
Raccoon	<i>Procyon lotor</i>
Skunk	<i>Mephitis mephitis</i>
Gray Squirrel	<i>Sciurus carolinensis</i>
Ruffed grouse	<i>Bonasa umbellatus</i>
Woodcock	<i>Philohela minor</i>
Mourning Dove	<i>Zenaidura macoura</i>
Woodchuck	<i>Marmota monax</i>
Bobwhite quail	<i>Colinus virginianus</i>
Opossum	<i>Didelphis marsupialis</i>
Red fox	<i>Vulpes fulva</i>
Cardinal	<i>Richmondena cardinalis</i>
Bluejay	<i>Cyanocitta cristata</i>
Robin	<i>Turdus migratorius</i>
Goldfinch	<i>Spinus tristis</i>
Chickadee	<i>Parus atricapillus</i>
Sparrow	<i>Spizella spp.</i>
Brown thrush	<i>Hylocichla mustelina</i>
Swallow	<i>Hirundo rustica</i>
Downy woodpecker	<i>Dendrocopos pubescens</i>
Common crow	<i>Corvus brachyrhynchos</i>
Eastern chipmunk	<i>Tamias striatus</i>
Mice	<i>Microtus spp.</i>
Wood duck	<i>Aix sponsa</i>
Black duck	<i>Anas rubripes</i>
<b>Fish</b>	
Common suckers	<i>Catostomus commersoni</i>
Brook trout	<i>Salvelinus fontinalis</i>
Blacknose dace	<i>Rhinichthys atratulus</i>
Minnows	family CYPRINIDAE

## Amphibians

Bullfrog  
Red-backed salamander

*Rana catesbeiana*  
*Plethodon cinereus*

## Aquatic Invertebrates

Water Strider  
Water boatman  
Diving beetle  
Beetles  
Dragonfly  
Midge  
Caddisfly  
Crayfish  
Freshwater snails  
Leech  
Dobsonfly

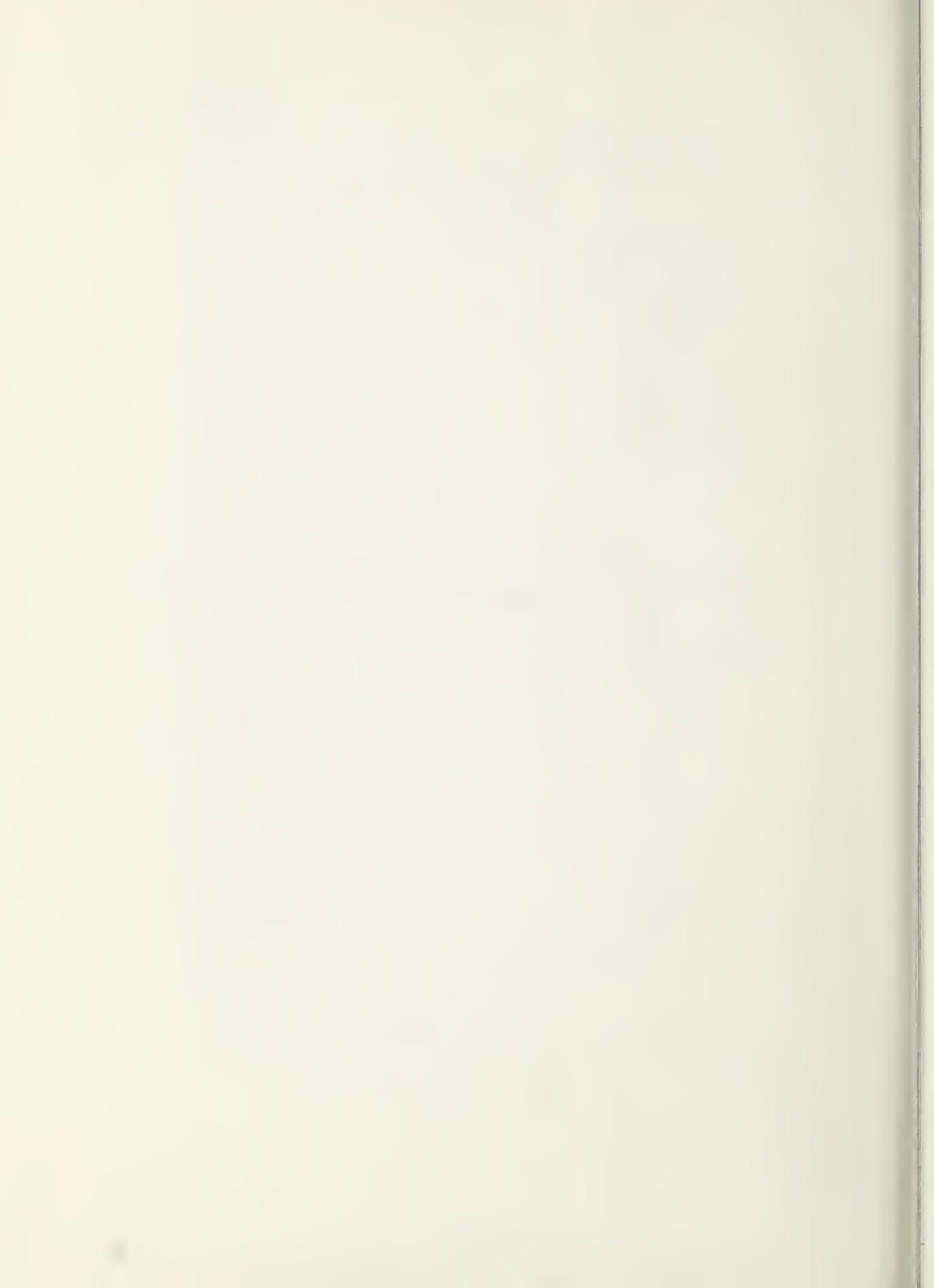
family GERRIDAE  
family CORIXIDAE  
family DYTISCIDAE  
order COLEOPTERA  
order ODONATA  
order DIPTERA  
order TRICHOPTERA  
*Cambarus* spp.  
class GASTROPODA  
class HIRUDINEA  
*Corydalus cornutus*

## Plants and trees

Corn  
Silage corn  
Potatoes  
Sweet corn  
Squash  
Tomatoes  
Horseradish  
Apples  
Pears  
Peaches  
Fescues  
Brome  
Clover  
Alfalfa  
Oak  
Hickory  
White pine  
Pitch pine  
Red maple  
Hemlock  
Ash

*Zea mays*  
*Zea mays identia*  
*Solanum tuberosum*  
*Zea mays saccharata*  
*Cucurbita* spp.  
*Lycopersicon esculentum*  
*Armoracia rusticana*  
*Malus pumila*  
*Pyrus communis*  
*Prunus persica*  
*Festuca* spp.  
*Bromus* spp.  
*Trifolium* spp.  
*Medicago sativa*  
*Quercus* spp.  
*Carya* spp.  
*Pinus strobus*  
*Pinus rigida*  
*Acer rubrum*  
*Tsuga canadensis*  
*Fraxinus* spp.

**APPENDIX F**



(COPY)

CONNECTICUT ARCHAEOLOGICAL SURVEY, INC.  
1615 Stanley Street - New Britain, Connecticut 06050 - (203)225-7481

May 20, 1975

Mr. H. Ted Evans, State Administrative Officer  
United States Department of Agriculture  
Soil Conservation Service  
Mansfield Professional Park  
Storrs, Connecticut 06268

Dear Mr. Evans:

The archaeological survey of the Avery Brook Watershed has been completed, and the following information is submitted:

1. An investigation of the Archaeological Survey site records produced no known sites in the Avery Brook Watershed area.
2. A consultation with local members of the Archaeological Society of Connecticut indicated no significant collection of surface finds in the vicinity. Information received from the land owner (Mr. Welles?) indicated that occasionally stray finds had been made in the general area, but none in the impacted area.
3. An on-site survey revealed that much of the area to be covered by the flood water retarding structure is currently wetland. A surface survey was conducted of these impacted areas and test pits were dug in several locations. No cultural information was recovered.

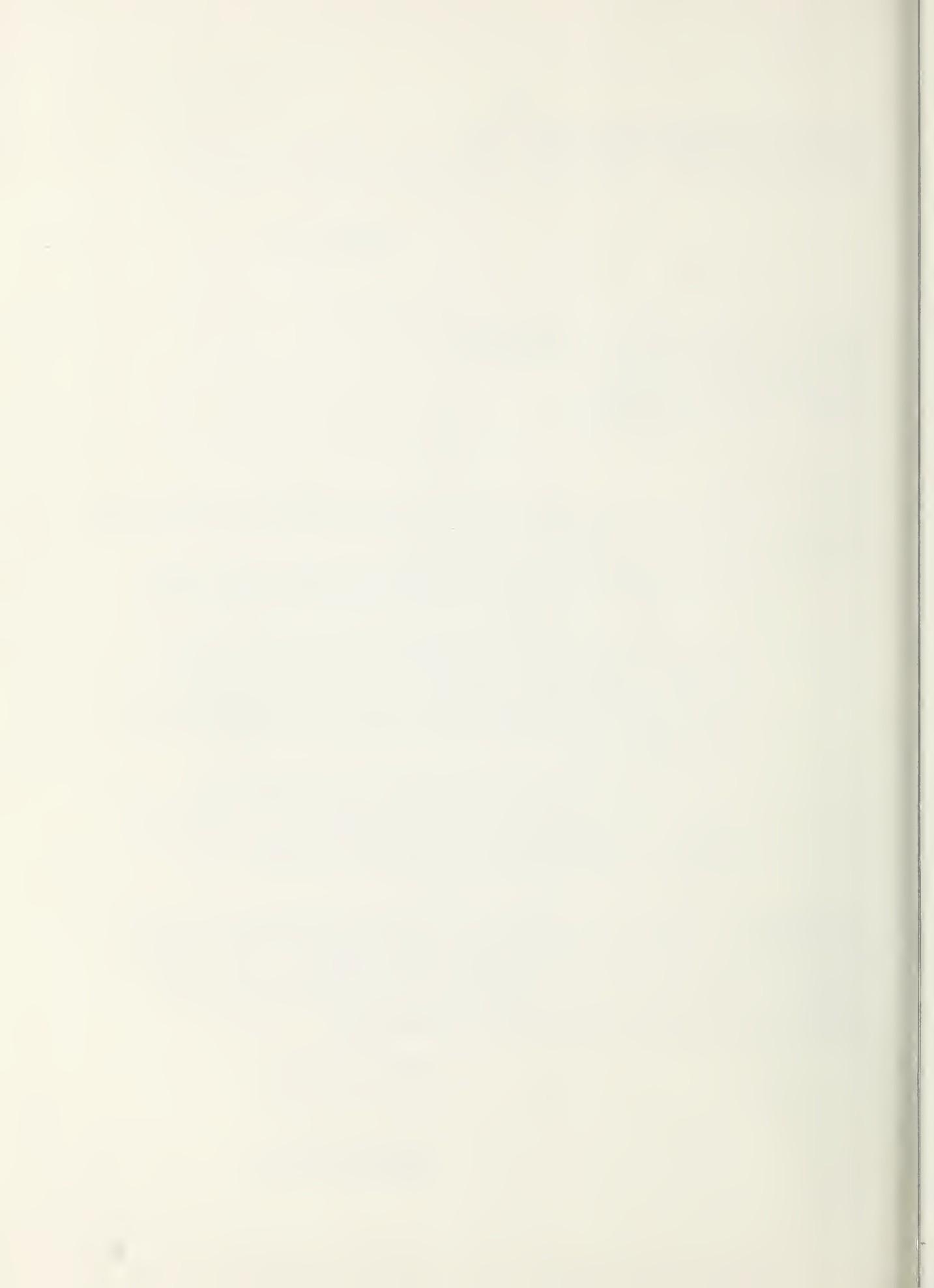
Accordingly, a tentative evaluation of the Avery Brook Watershed would indicate no significant archaeological remains. If, however, during the course of the watershed development any evidence of archaeological remains is discovered, it is understood that either the undersigned, or the Connecticut Historical Commission will be notified so that appropriate salvage archaeology may be undertaken.

Sincerely yours,

/s/ F. W. Warner

Frederic Warner  
Executive Director

FW/r



STATE OF CONNECTICUT  
CONNECTICUT HISTORICAL COMMISSION  
59 South Prospect St. Hartford, Connecticut 06106  
Area Code 203 566-3005

(COPY)

Eric Hatch, Chairman  
William J. Morris, Director  
Herbert C. Darbee, Associate Director  
John W. Shannahan, Special Assistant  
David O. White, Special Assistant

11 August, 1972

Mr. Robert L. Hilliard, State Conservationist  
Soil Conservation Service  
Mansfield Professional Park  
Storrs, Connecticut

Dear Mr. Hilliard:

In response to your letter of 14 July, 1972, copy enclosed, our staff on 2 and 4 August conducted an on-site inspection of the indicated Avery Brook Watershed area, South Windsor. Our primary function would be to identify any sites or structures of historical or architectural importance within or near the watershed boundary as delineated on the accompanying map. Two such have been located:

A - House at 359 Avery Street, west side, second property south of junction with Clinton Drive. Center-chimney, 9-window front, painted dark red.

B - House on south side of Dart Hill Road, about 1200 feet west of junction with Avery Street. Apparently vacant, twin-chimney, 2-story and attic, 9-window front, painted red with white trim. Lower stone portion of silo stands behind, and water tower to left rear.

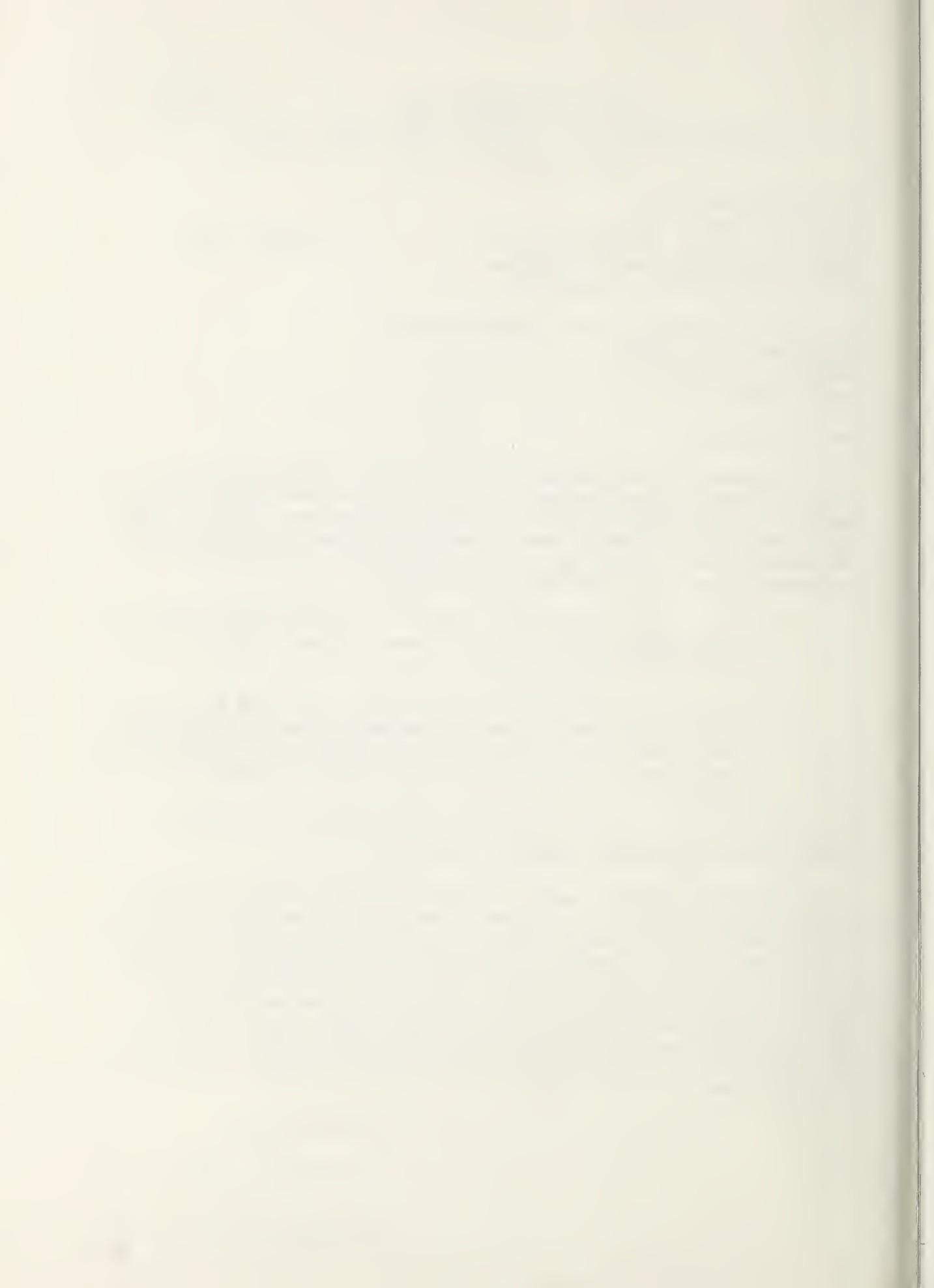
Both of these structures appear to be of sufficient quality to warrant protection against damage or loss.

As you are doubtless aware, a number of roads, lined with recent houses on both sides, do not appear on the map as submitted. At the time of survey, off Fairview Drive in the north section of the watershed, a bulldozer was busy clearing away trees and other vegetation to make additional streets, and Tumblebrook Drive in the same area was being extended with considerable building activity. It was our impression that no further time can be lost if any considerable part of the delineated area is to be preserved from the kind of development that has overwhelmed and completely altered the southeastern third of it eastward of Avery Street.

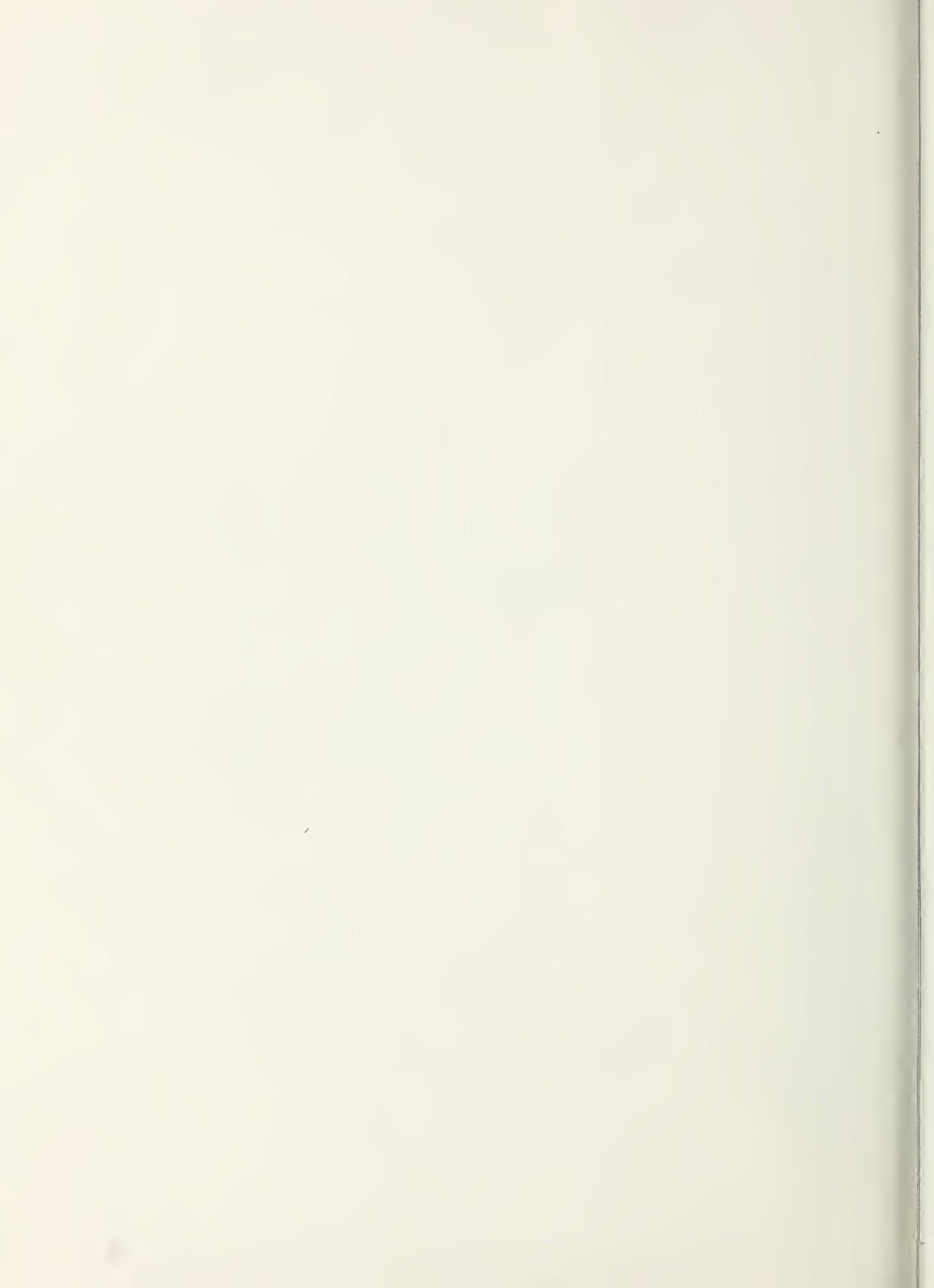
Cordially yours,

/s/ Herbert C. Darbee

Herbert C. Darbee  
Associate Director



APPENDIX G

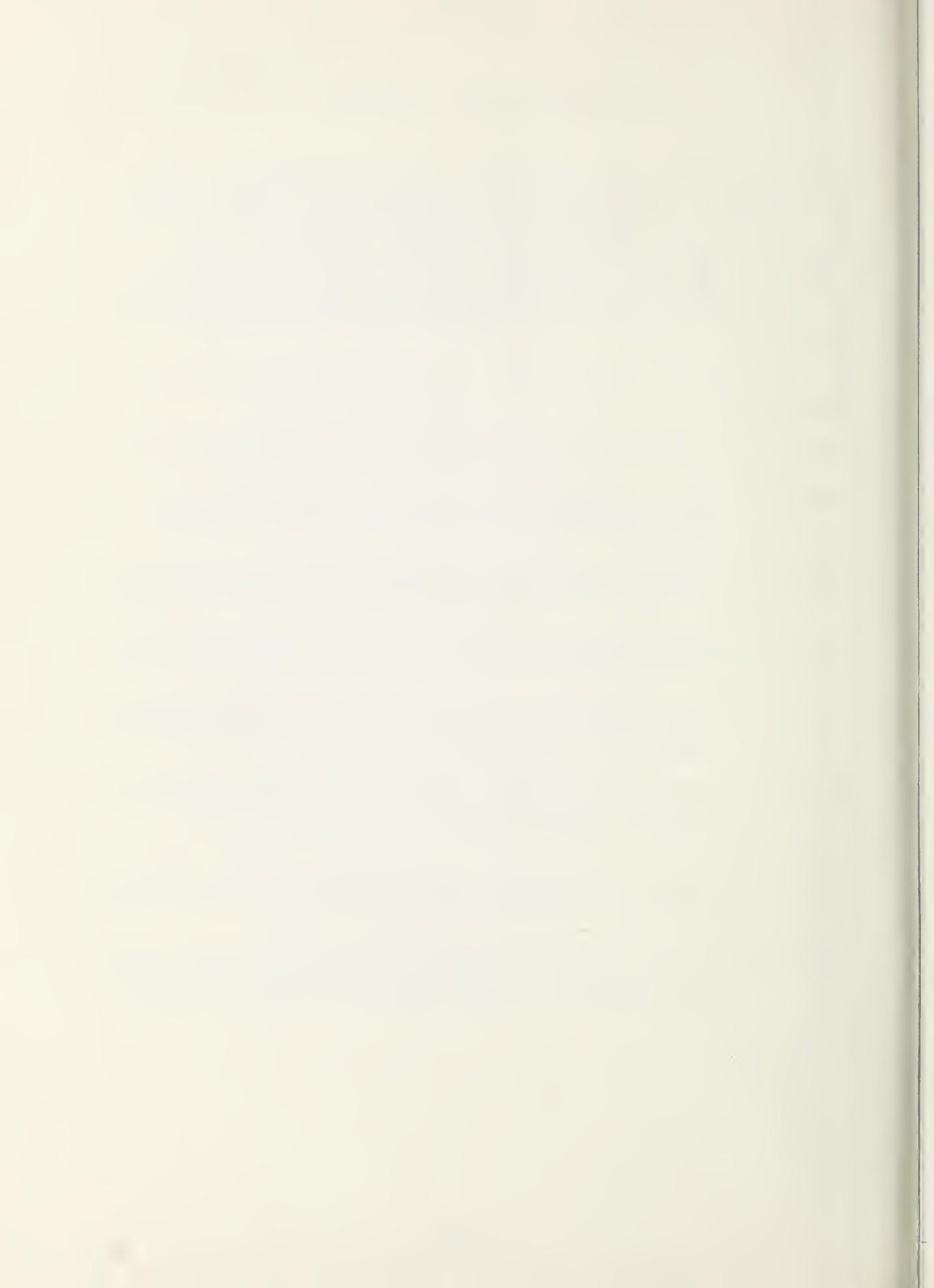


## SOIL CAPABILITY CLASS DESCRIPTIONS

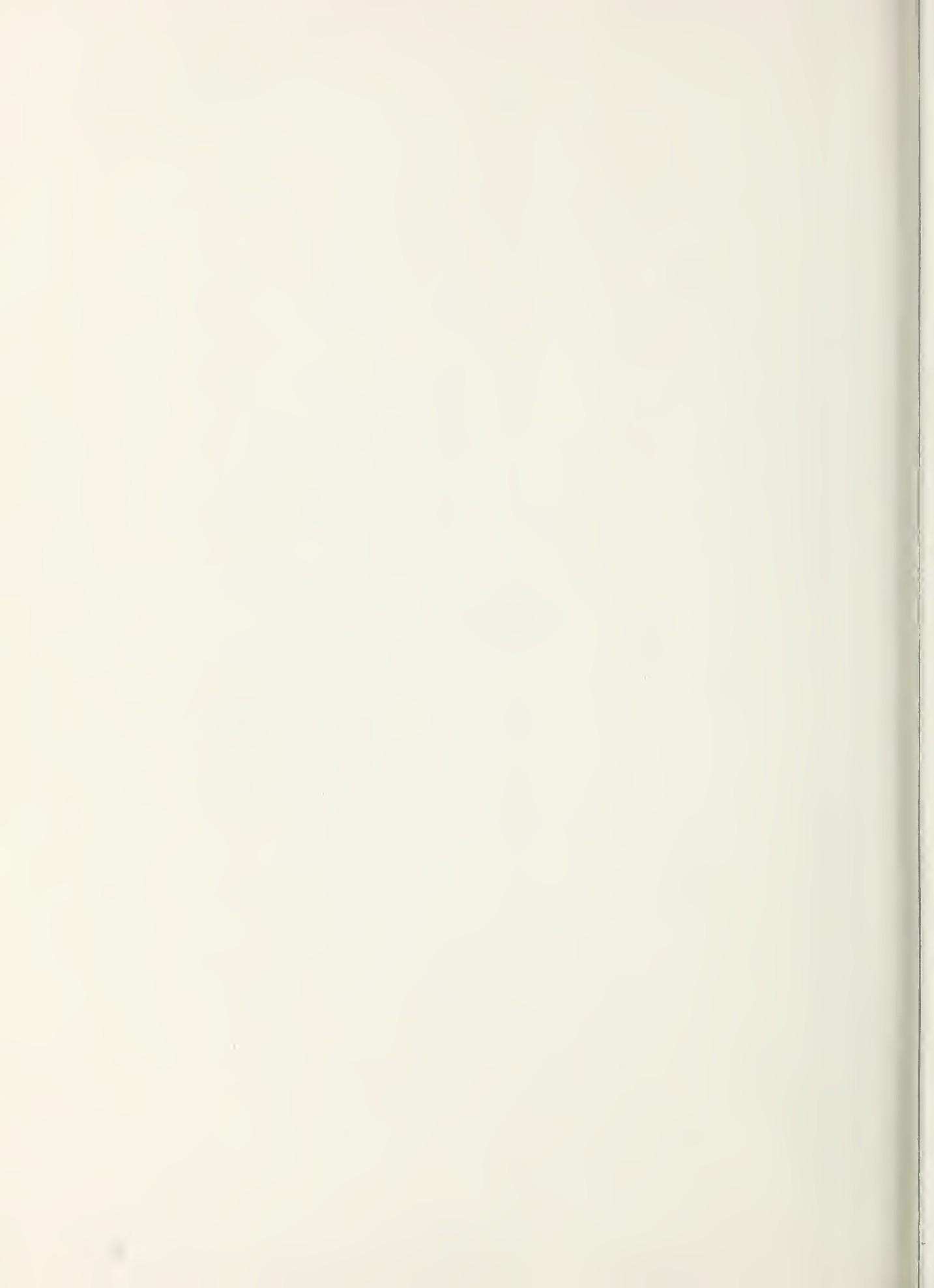
Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to crops requiring special management.

The eight classes in the capability system are described in the list that follows.

- CLASS I - Soils that have few limitations that restrict their use.
- CLASS II - Soils that have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
- CLASS III - Soils that have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- CLASS IV - Soils that have very severe limitations that reduce the choice of plants, require very careful management, or both.
- CLASS V - Soils that are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife.
- CLASS VI - Soils that have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.
- CLASS VII - Soils that have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.
- CLASS VIII - Soils and landforms having limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

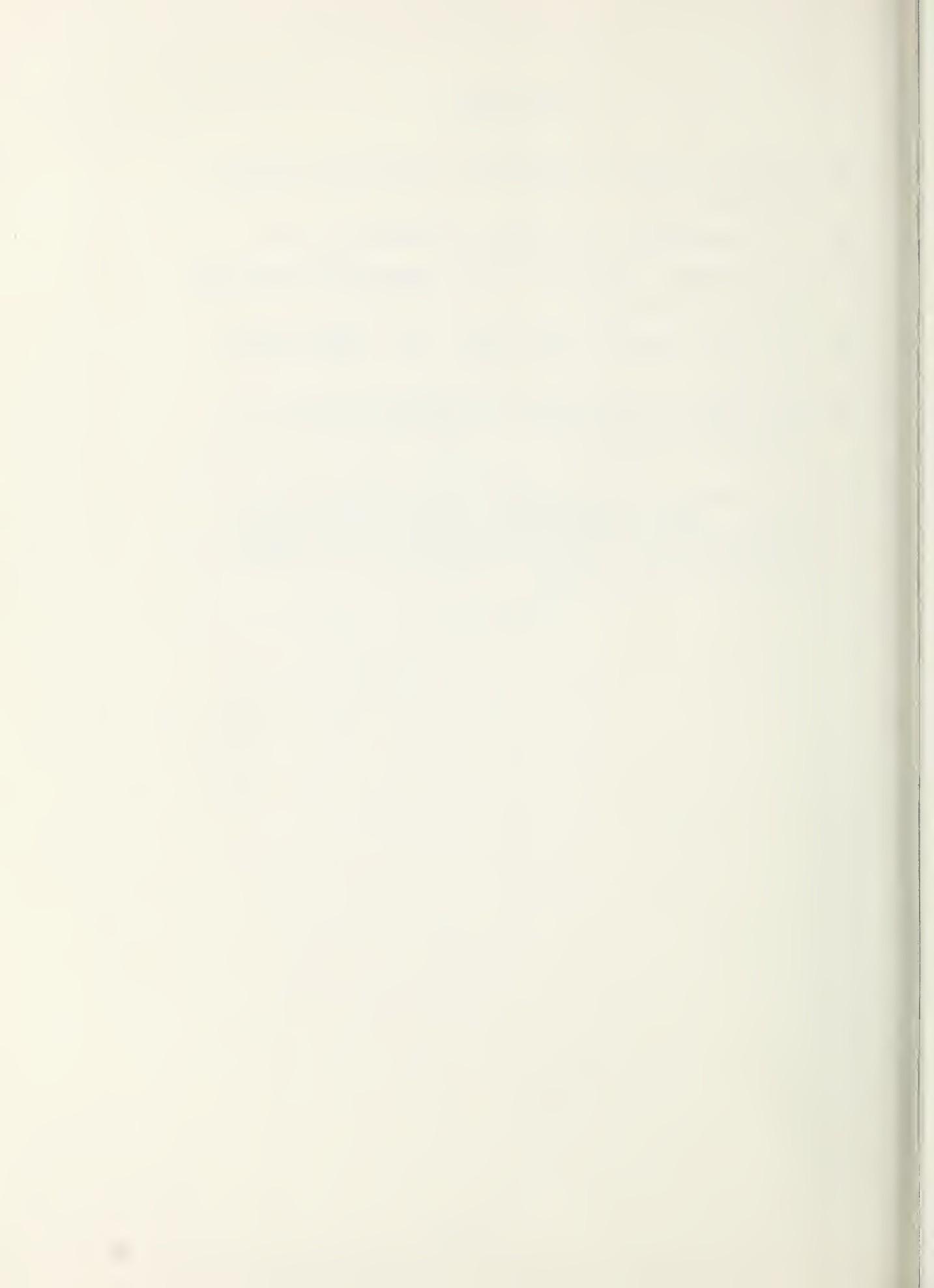


APPENDIX H

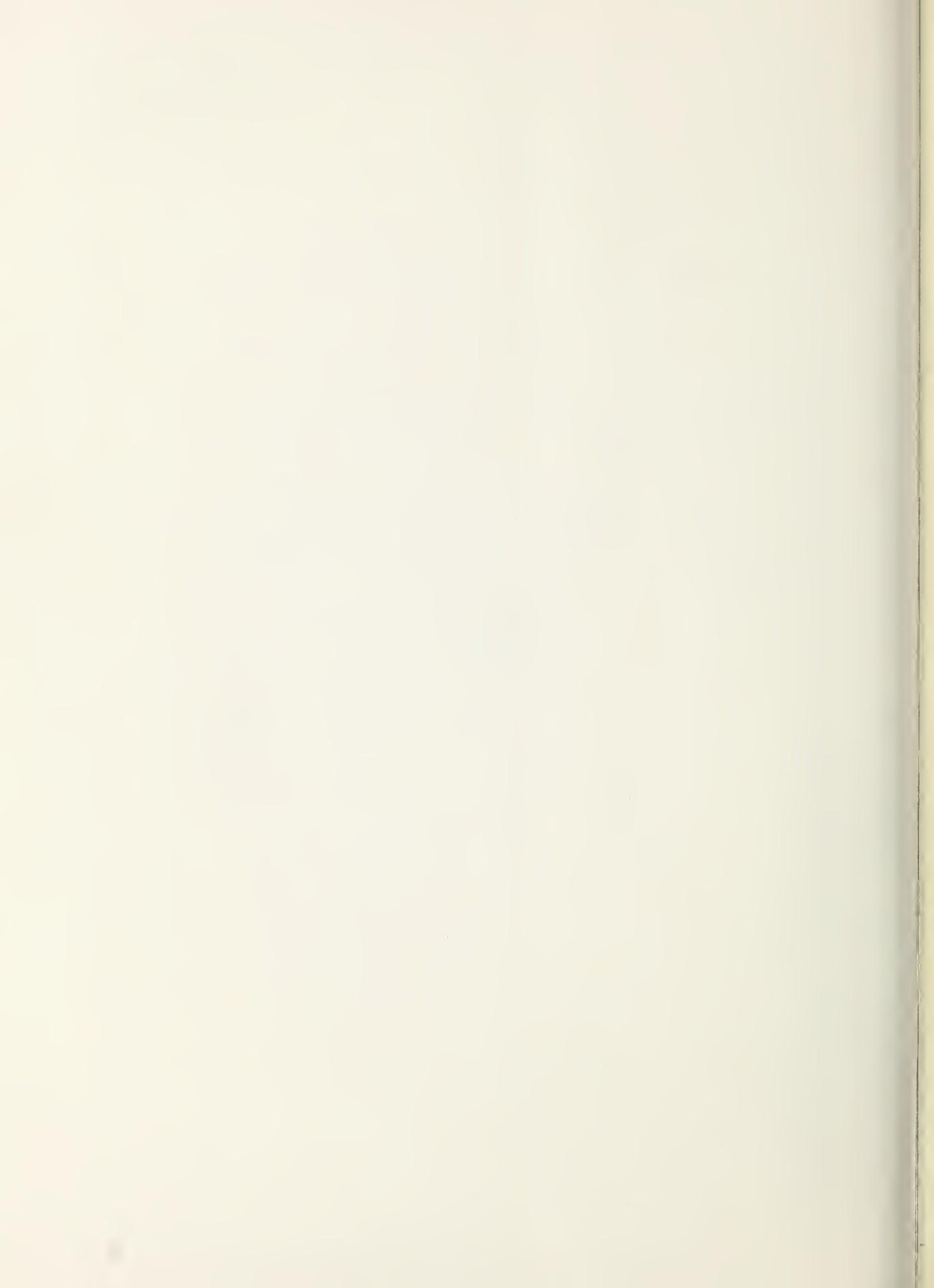


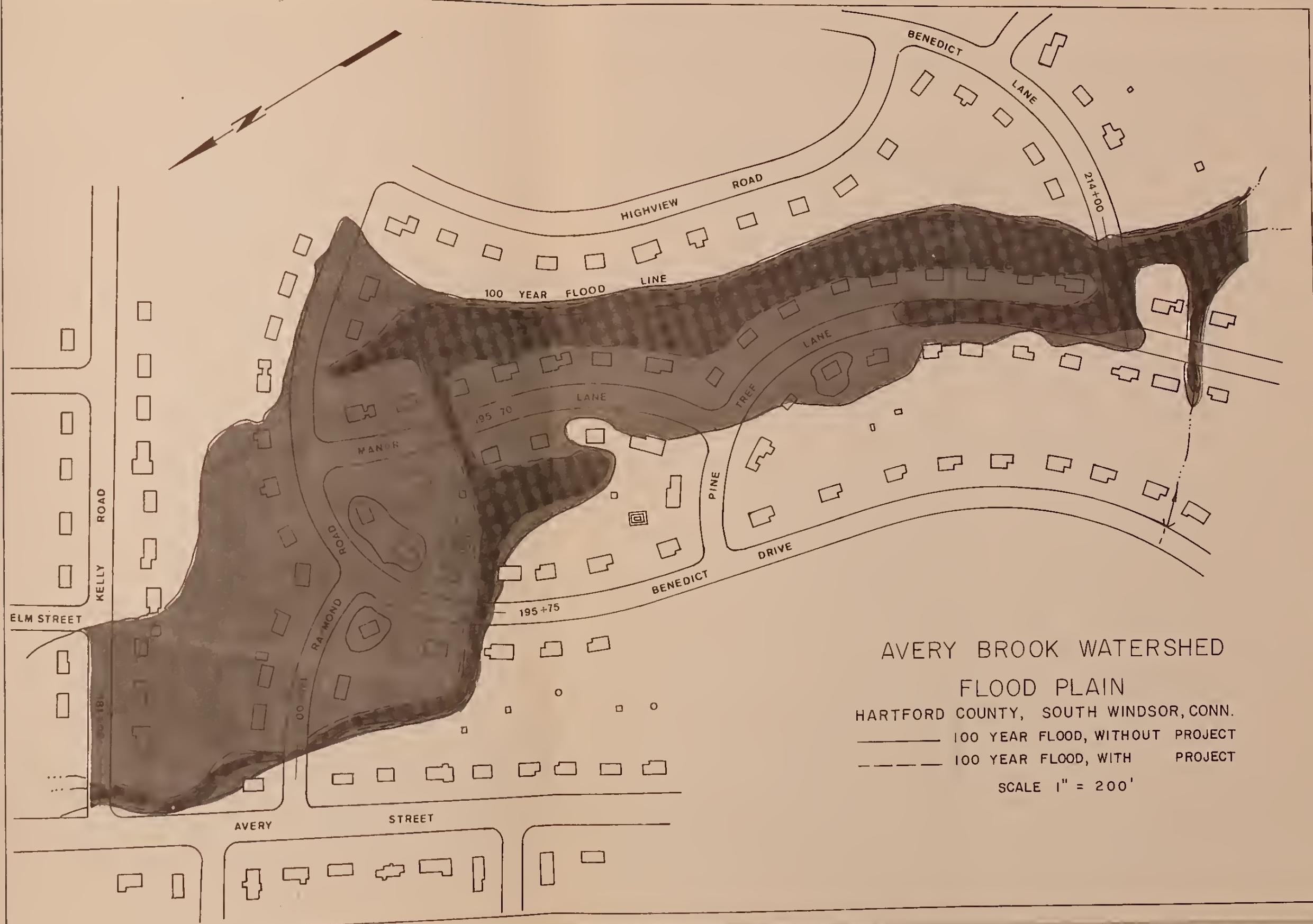
## BIBLIOGRAPHY

- (1) Brumback, "Climate of Connecticut," Department of Natural Resources, p.77.
- (2) U. S. Department of the Interior, Circular 39, p. 22.
- (3) Water Resources Commission, 1970. Water Quality Standards, Hartford, Connecticut.
- (4) State Water Quality Control Board, 1963. Water Quality Criteria, Sacramento, California.
- (5) 1970 Census of Population, Characteristics of the Population, Volume 1, Part 8, Connecticut, United States Department of Commerce.
- (6) The fishery and benthic surveys were conducted by Dr. R. J. Reed, Massachusetts Cooperative Fishery Unit through cooperative agreement between the Soil Conservation Service and the U. S. Department of the Interior, Fish and Wildlife Service.



APPENDIX I





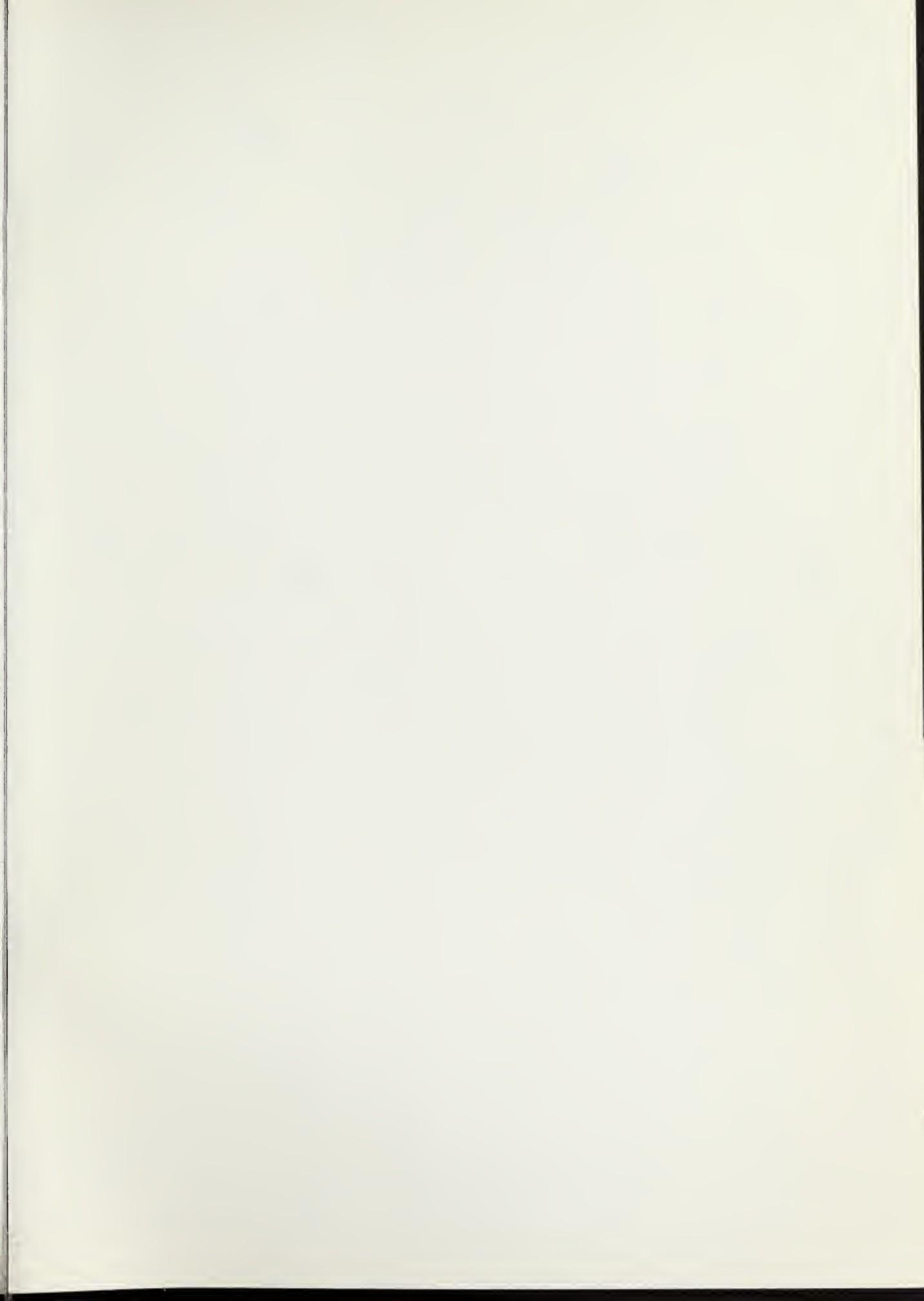
AVERY BROOK WATERSHED  
FLOOD PLAIN

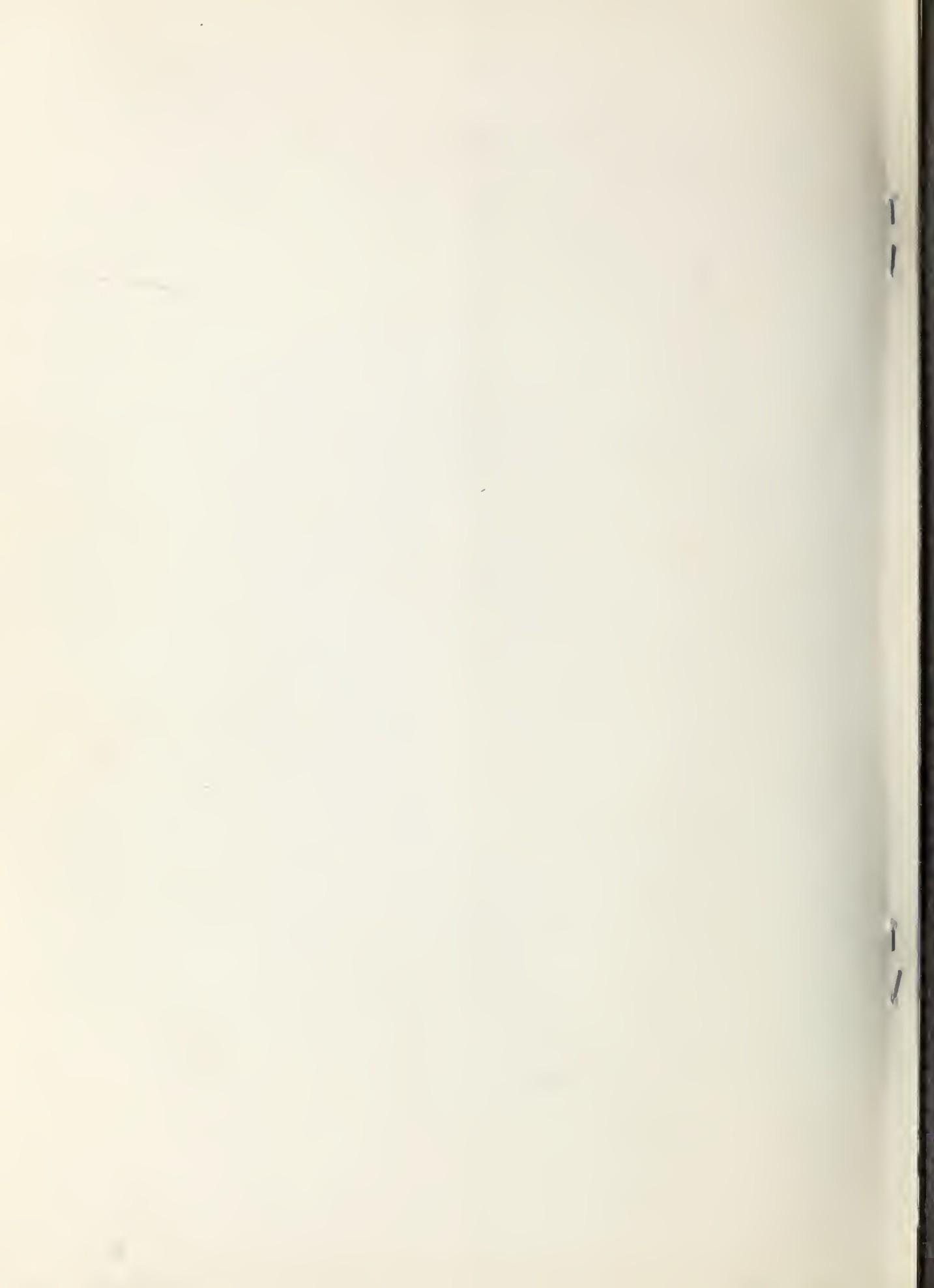
HARTFORD COUNTY, SOUTH WINDSOR, CONN.

— 100 YEAR FLOOD, WITHOUT PROJECT  
- - - 100 YEAR FLOOD, WITH PROJECT

SCALE 1" = 200'







APRIL2013



RIGHT



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Avery Brook Watershed, Hartford County, Connecticut : final watershed  
and environmental impact statement

aTC425.A9U5

1976

1976

Batch: NAL15\_mono



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federal agency responsible for managing an installation of works of  
environmental significance.

Avery Brook Watershed

		Estimated Cost (Dollars) 1/					
		Number	PL-566 Funds	Total	Non-Federal Land	Total	Other
Installation Cost Item		Unit	Federal	SCS 3/	FS 3/	SCS 3/	Total
<u>LAND TREATMENT - GOING PROGRAM</u>							
Individual Practices Such As							
Fire Control		Acres	500			1,200	1,200
<u>SUBTOTAL</u>						1,200	1,200
<u>LAND TREATMENT - ACCELERATED</u>							
<u>Land area 2/</u>							
Cropland		Acres	150	4,800	4,800	4,800	4,800
Pastureland		Acres	15	1,600	1,600	1,600	1,600
Forest land		Acres	150	7,500	7,500	7,500	7,500
Urban and Built-up		Acres	395	31,000	23,200	54,200	54,200
Other Land		Acres	40	19,000	19,000	19,000	19,000
Technical Assistance				10,200	9,700	19,900	5,100
<u>SUBTOTAL</u>				10,200	9,700	19,900	61,500
<u>TOTAL LAND TREATMENT</u>				10,200	9,700	19,900	33,500
<u>NONSTRUCTURAL MEASURES</u>		No.	5				
Floodproofing					8,000		8,000
<u>SUBTOTAL Nonstructural Costs</u>					8,000		8,000
<u>STRUCTURAL MEASURES</u>							
Floodwater Retarding							
Structures	No.		2	271,900	271,900	383,900	383,900
<u>SUBTOTAL Structural Costs</u>				271,900	271,900	383,900	383,900
<u>PROJECT ADMINISTRATION</u>							
Construction Inspection				29,600	29,600	29,600	29,600
Other				12,300	12,300	7,000	19,300
<u>SUBTOTAL - Administration for Nonstructural and Structural Measures</u>						7,000	
<u>TOTAL STRUCTURAL AND NONSTRUCTURAL COSTS</u>				41,900	41,900	7,000	48,900
<u>TOTAL ALL COSTS</u>				313,800	313,800	398,900	398,900
				324,000	9,700	333,700	460,400
						33,500	493,900
							827,600

1/ Price Base 1976  
 2/ Includes only areas estimated to be adequately protected during the project installation period.

Treatment will be applied throughout the watershed, and dollar amounts apply to total land areas, not just to adequately protected areas.

3/ Federal agency responsible for assisting in installation of works of movement. Revised April 1977



